BULLETIN NO. 23. NEW SERIES.

Agricultural Experiment Station

OF THE

Agricultural and Mechanical College,

AUBURN, ALA., - - - - - - - FEBRUARY, 1891.

Co-Operative Soil Tests of Fertilizers.

Report of Alabama Weather Service.

☞ The Bulletins of this Station will be sent Free to any citizen of the State, on application to the Director.

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CO-OPERATIVE SOIL TESTS—1890.

J. S. NEWMAN.

So great is the variety of soils in Alabama and such the demand for knowledge of their needs, that a call for volunteer experimenters was issued in January, 1890, through the official organ of the Farmer's Alliance of the State. The response was prompt and the desired number—thirty—soon secured.

The results printed in this bulletin show how faithfully and intelligently they have discharged their duty thus voluntarily assumed for the general good of the tillers of soils similar to their own.

Notwithstanding the fact that the first shipment of chemicals to the experimenters was lost in a railroad wreck, and some two weeks passed before the loss was reported, rendering it necessary to duplicate the order for the chemicals, as well as all of the labor of mixing and labeling them, thus delaying their reception by the experimenters, the number of reports as well as the manner in which the experiments were conducted leave no room for complaint. Indeed, the number of satisfactory reports is most gratifying.

The following extract from Bulletin No. 12, New Series, illustrates the plan of the experiments and embodies the detailed instructions then furnished each experimenter:

DIRECTIONS FOR CONDUCTING SOIL TESTS WITH FERTILIZERS, 1890.

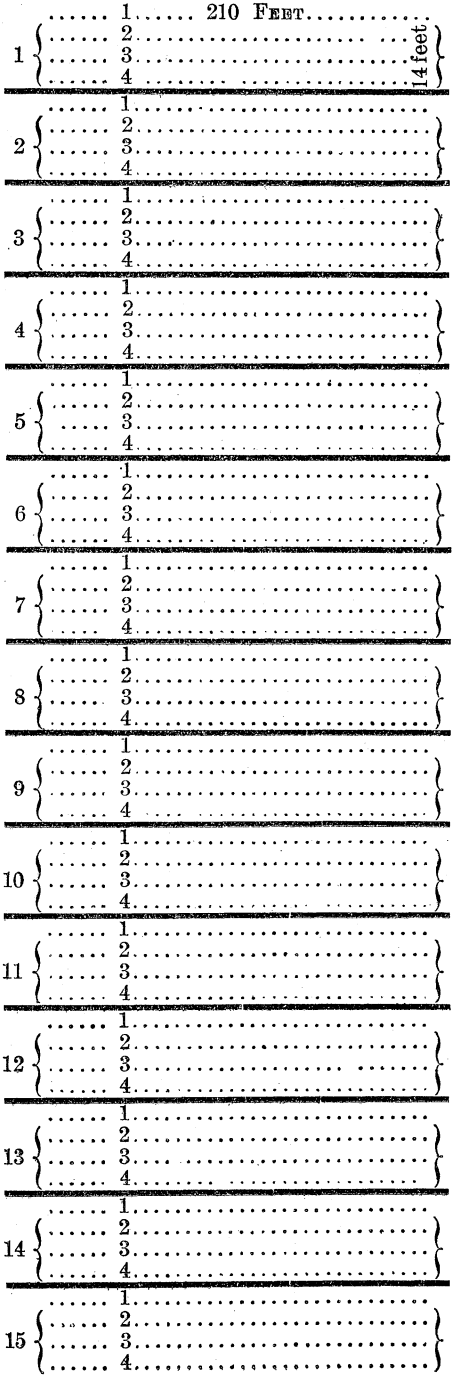
SELECTION OF LAND.

The area upon which the experiment is made should be level, or nearly so; should represent in character of soil and subsoil the section in which the experimenter lives, should not have been fertilized for several years, or better still, never at all, but should not be new or fresh land; the object being to learn what fertilizer the ordinary cultivated lands of the section need.

ARRANGEMENT OF PLOTS.

The accompanying diagram shows the arrangement of the plots. There will be fifteen plots of 1-15 of an acre each. For convenience, the "farmer's acre," seventy yards square, is used. Each plot is, therefore, 210 feet long and 14 feet wide, admitting of four rows of cotton $3\frac{1}{2}$ feet apart. All of the experiments will be made with cotton this year.

DIAGRAM OF EXPERIMENT PLOTS.



6 lbs. Sul. Ammonia.

13 lbs. Dis. Bone Black.

10 lbs. Kainit.

No Manure.

6 lbs. Sul. Ammonia.
10 lbs. Kainit.

6 lbs. Sul. Ammonia.
13 lbs. Dis. Bone Black.

13 lbs. Dis. Bone Black.
10 lbs. Kainit.

No Manure.

6 lbs. Sul. Ammonia.
13 lbs. Dis. Bone Black.
10 lbs. Kainit.

20 lbs. Floats.

20 lbs. Floats.
6 lbs. Sul. Ammonia.

No Manure.

53 lbs. Green Cotton Seed.

53 lbs. Green Cotton Seed.
20 lbs. Floats.

265 lbs. Stable Manure.

FERTILIZERS.

The fertilizers are sent, *freight prepaid*, to the depot designated by each experimenter. That intended for each plot bears two labels—one showing its contents, the other the number of the plot to which it is to be applied. As shown in the diagram, each fertilizer is to be applied to four rows. Each row should receive as nearly as possible the same quantity. Numbers 4, 8 and 12 are to receive no fertilizer. The experimenter is expected to furnish the cotton seed for plots 13 and 14, and the stable manure for 15.

Apply the cotton seed in a deep furrow and distribute the floats over the seed in plot 14. In plots 13 and 15 distribute the cotton seed and stable manure respectively, and bed upon them as on the fertilizers in the other plots.

PREPARATION.

First break the land "flush," deeply and thoroughly after accurately measuring the area 210 feet square. Lay off rows *exactly* $3\frac{1}{2}$ feet apart, distribute the fertilizers and bed with a good turn plow, making a high bed. Then draw a harrow or heavy brush across the beds. It is important to secure a perfectly uniform stand of plants, and hence the seed-beds ahould be thoroughly prepared.

PLANTING.

Use the same kind of seed upon the whole area and plant all of the plots the same day. If a part was planted before and the rest after a rain, the experiment would be worthless. Use every precaution necessary to secure a full stand. If a uniform stand is not secured at the first planting, plow up promptly and plant again.

CULTIVATION.

As soon as the plants are large enough "side" with a scrape or sweep and, several days after, chop to *two stalks* every *two feet*. As soon as danger of loss by cold or cut worms has passed reduce the stand to *one stalk* in the hill. Rows 2 and 3 of each plot are to be gathered to determine the yield from each fertilizer. This reduces the "test area" to 1-30 of an acre. One missing stalk on this area would therefore represent 30 to the acre. To make the experiment reliable, therefore, there must be the same number of stalks upon each such "test area." To insure this, when the plants are eight or ten inches high, count carefully the stalks in rows 2 and 3 of each plot. A perfect stand would give 105 stalks to the row or 210 on rows 2 and 3.

Suppose the count shows that the number of stalks range from 210 to 190 to the test areas. *Reduce the number of plants to* 190 *in all of the test areas* (rows 2 and 3 of each plot), by pulling from each the number of stalks it was found to contain *above* 190. This is the only *reliable* way to secure uniformity of stand, without which the experiments *cannot be accurate.* Replanting, the method often resorted to, will not answer.

Let all the plots be cultivated on the same day and in exactly the same manner through the season. See that no tree stands within 100 feet of any of the plots.

MEMORANDA.

Record in a book kept exclusively for that purpose the time and manner of performing every operation connected with the experiment, from the preparation of the land to the gathering of the crop. Make weekly or bi-weekly notes on the appearance of the cotton on the plots. Note especially the effects of either excessive moisture or drouth upon plants of the different plots. Record any changes in the weather likely to affect the growth or fruitfulness of the cotton plant, such as unusually high or low temperature, excessive rain-fall or continued drouth, and note the different effects, if any upon the plots; keep a careful record of the "seasons" and their apparent effects upon soil and plants.

GATHERING.

Before the crop matures printed blanks upon which to record results will be furnished. The slightest mistake in gathering or weighing the seed-cotton will destroy the value of the experiment. The utmost care is necessary to prevent such mistakes. The picking and weighing of the product of the different plots must be done under uniform conditions.

Picking should not be commenced until the morning dew has disappeared from the cotton. If some plots are picked and weighed in the early morning and others in the afternoon, accuracy will be sacrificed. Each experimenter must exercise a sound judgment in these matters of detail, looking constantly to securing *perfect accuracy* in the comparison of the effects of the fertilizers. Experiments, like statistics, unless full and accurate, are misleading.

No account need be kept of the production of rows one and four, as they being only 3½ feet from the adjacent plots to which different fertilizers are applied, receive, by the spread of their roots, the benefit of both fertilizers. The product of rows two

and three will be used to compare the effects of the different fertilizers. The plants in these rows being seven feet from those to which a different fertilizer was applied, only the extremities of their longest roots will reach it, and hence will not be materially affected by it. Pickings should be made with sufficient frequency to avoid risk of having the experiment vitiated by storm. Record the weight and date of each picking. Record the average height of the stalks upon each "test area," rows two and three in each plot. Note the character and extent of injury to the plants by any casualty, such as storms, boll worm, caterpillar, rust or blight. When the plants are sufficiently advanced in growth to show plainly the effects of the fertilizers, invite the farmers of the neighborhood to inspect the plots at intervals during the season. This is important, since the object of the experiment is to be benefit the farmers who cultivate the character of land upon which the experiment is made.

The chemicals were sent in the spring of 1890, to the following named gentlemen for experiment. Several of them failed to receive the chemicals or received them in such a mingled condition as to render them unfit for experimental use. One who received two sets of chemicals for different types of soil was prevented from giving the work such personal attention as he deemed necessary to secure accuracy on account of protracted illness. Twenty-four reports, however, out of thirty, is very satisfactory.

The results of several years of such inquiry must prove profitable to the farmers of the State, since there will be but few who cannot find in some of the reports a counterpart to their soils and *indications* of their chemical deficiencies.

Experimenters, 1890.

NAMES.	COUNTY.	POST-OFFICE.
Askew, B. F.	Chambers	Cusseta, Alabama.
Aday, L. C., Rev.	Franklin	Newburgh.
Beasley, E. J.	Covington	Red Level.
Brown, D. L	Bibb	Randolph.
Bishop, M. A.	Madison	Madison.
Compton, Geo. W.	Marengo	Dixon's Mills.
Cross, R. H.	Lowndes	Letohatchie.
Davis, E. M., Maj	Autauga	Prattville.
Davison, J. A.	Choctaw	Yantly Creek.
Dick, R. M.	Etowah	Attalla.
Ewing, R. T.	Cherokee	Centre.
Eubank, A. H	Montgomery	Pine Level.
Ellison, J. M.	Macon	Creek Stand.
Gordon, John, Dr.	Washington	Healing Springs.
Hobdy, J. M	Barbour	Louisville.
Hall, S. M.	Marion	Hackleburgh.
Jeter, O. T.	Chambers	Boyd's Tank.
Killebrew, J. C.	Dale	Newton.
Miller, W. H.	Greene	Union.
McEwin, G. W.	Coosa	Rockford.
Martin, William	Hale	Greensborough.
Newman, W. H.	Perry	Uniontown.
Newman, C. L	Limestone	Athens.
Oliver, J. P.	Tallapoosa	Dadeville.
Perkins, J. W.	Marshall	North.
Reeves, W. M	Wilcox	Nellie.
Stroud, Z. T.	Bullock	Aberfoil.
Stephens, A. B	Etowah	Keener.
Watlington, T. M.	Henry	Abbeville.

EXPERIMENT BY REV. L. C. ADAY—NEWBURG, FRANKLIN CO.

Soil—Red cedar land with clay subsoil. Mr. Aday lives seven and one-half miles east of Russellvile, Alabama.

Mr. Aday's report shows very thorough preparation of the soil and cultivation of the crop. He used the sweep throughout the cultivation.

He remaks that, "Owing to the amount of rain from August 1st, to about October 1st, the plants went too much to weed and became so rank that the bottom bolls rotted. An early frost cut off the top crop to a large extent."

The results obtained from plots four, eight and twelve indicate a want of uniformity in the soil to the disadvantage of the plots adjacent to four. The general indications from the results are that the soil needed nitrogen and phos. acid. Further inquiry, however, is needed, since the loss from rotting of the bottom crop was probably greatest where the plants matured the largest per cent. of early fruit, and with the fertilizers which induced the most luxuriant growth.

Mr. Aday remarks that the season was very unfavorable for cotton in his section, and hence he was desirous of repeating the experiment.

The following tabulated statement gives results as reported by Mr. Aday:

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Total yield per plot.	Total yield per acre.	Remarks.
			Oct. 15.	Nov. 28.			
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia....	22½	2½	25	750	Plot No. 1 very promising till 1st of Aug. Rust appeared on it then, and caused the leaves and small fruit to fall off.
2	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	22	4	26	780	Plots Nos. 3, 7 and 11 turned yellow owing to a dry spell from June 1st to 24th, which caused it to shed the forms to some extent.
3	10 lbs. Kainit.....	150 lbs. Kainit.....	24	4	28	840	
4	No Manure.....	No Manure.....	16½	3	19½	585	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	26½	6	32½	975	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	28½	6	34½	1035	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	26	7½	33½	1005	
8	No Manure.....	No Manure.....	23½	6½	30	900	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Cone Black..	31	5½	36½	1095	
10	20 lbs. Floats.....	300 lbs. Floats.....	24	7	31	930	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	30½	8	38½	1155	
12	No Manure.....	No Manure.....	24	7½	31½	945	
13	53 lbs. Green Cotton Seed.	795 lbs. Green Cotton Seed	24	8	32	960	
14	20 lbs. Floats, 53 lbs. Green Cotton Seed.	300 lbs. Floats, 795 lbs. Green Cotton Seed	20	12½	32½	975	
15	265 lbs. Stable Manure...	3,975 lbs. Stable Manure..	24	2½	26½	795	

EXPERIMENT OF MR. E. J. BEASLEY—RED LEVEL, COVINGTON CO.

Soil—Red sandy ; subsoil, clay.

The effects of phosphoric acid are especially marked upon Mr. Beasley's soil. While neither potash nor nitrogen, used singly with the phosphoric acid, materially increased the yield over that of phosphoric acid used alone, when the proper allowance is made for the difference in the soil indicated by the unfertilized plots, still their combined effect upon plot nine to which the complete manure was applied, shows that their presence materially increased the productive power of the phosphoric acid. The three elements combined upon plot nine produced 330 lbs. of seed cotton per acre more than phosphoric acid and nitrogen, without the potash, and 300 more than the phos. acid and potash, without the nitrogen. The three combined produced 390 lbs. seed cotton per acre more than the phosphorie acid alone, and 770 lbs. more than the production of the unaided soil as indicated by the *average* yield of the unfertilized plots.

The complete manure used on plot nine nearly quadrupled the average production without manure.

The effect of the phosphoric acid in hastening the maturity of the cotton is most strikingly illustrated by the weights gathered in September.

The complete manure matured 62 lbs. in September, while the average from the unfertilized land was only $6\frac{2}{3}$ in that month.

The indications drawn from this experiment are that phosphoric acid is the element especially deficient in this soil, but that its efficiency is increased by combination with potash and nitrogen.

So far as can be judged from this one experiment, the results correspond very closely to those obtained from similar inquiries made upon the soil of this station. Attention is invited to the tabulated statement :

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Lbs. Cotton, 3rd picking.	Total yield per plot.	Total yield per acre.	Remarks.
			Sept.	Oct.	Nov			
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia ..	6	8	4	18	270	I Prepared the land as instructed in Bulletin
2	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	42	8	2	52	780	No. 12—planted April 15—cultivated regularly,
3	10 lbs. Kainit.....	150 lbs. Kainit	8	8	6	22	330	had six weeks drouth in the last of June and
4	No Manure.....	No Manure.	6	6	6	18	270	July, then had four weeks rainy weather. The
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit	4	6	6	16	240	cotton threw off all but the grown bolls. About the 20th of August the blight struck it and it did
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	48	6	2	56	840	no more. I gave it a fair test aud was very careful in cultivating it.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black...	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	42	14	2	58	870	
8	No Manure.....	No Manure	8	8	6	22	330	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black	62	12	4	78	1170	
10	20 lbs. Floats.....	300 lbs. Floats	14	14	4	32	480	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	22	10	6	38	570	
12	No Manure.....	No Manure.....	6	8	6	20	300	
13	53 lbs. Green Cotton Seed	795 lbs. Green Cotton Seed	22	8	6	36	540	
14	20 lbs. Floats, 53 lbs. Green Cotton Seed	300 lbs. Floats, 795 lbs. Green Cotton Seed	30	16	4	50	750	
15	265 lbs. Stable Maure.....	3,975 lbs. Stable Manure .	40	10	2	52	780	

Experiment of Mr. D. L. Brown, Randolph, Bibb County.

Soil—Light Sandy, Subsoil Clay.

The land had been cultivated in cotton for three years previous to 1890, and the results indicate that phosphates had been applied.

The crop was cultivated with sweeps.

* The results indicate that the soil was reasonably well supplied with phosphoric acid and potash, but deficient in nitrogen. Having been subjected to clean culture in cotton for three years previous to 1890, it was natural to expect results from the application of nitrogen, which readily leaches or volatilizes, while phos. acid remains in the soil. A decided increase results from the use of manures containing nitrogen or ammonia in every instance, while neither phos. acid nor potash meets with appreciable response. Attention is invited to the tabulated statement following.

* Since writing the above a card received from Mr. Brown states that 200 pounds of acid phos. was used per acre in 1888-9.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number.	Lbs. Fertilizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Lbs. Cotton, 3rd picking.	Total yield per Plot.	Total yield per Acre.	Remarks.
			Sept. 15	Oct. 8th	Nov. 1st			
1	6 lbs. Sul. Ammonia...	90 lbs. Sul. Ammonia....	6	22	2	60	900	
2	13 lbs. Dis. Bone Black.	195 lbs. Dis. Bone Black..	3	13	2	30	540	
3	10 lbs. Kainit.....	150 lbs. Kainit.....	1	12	3	32	480	
4	No Manure.....	No Manure	¼	10	4	28½	427½	Died worse than any.
5	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,						
	10 lbs. Kainit.....	150 lbs. Kainit.....	6	21	3	60	900	
6	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,						
	13 lbs. Dis. Bone Black.	195 lbs. Dis. Bone Black..	13	25	1	78	1170	
7	10 lbs. Kainit,	150 lbs. Kainit,						
	13 lbs. Dis. Bone Black.	195 lbs. Bone Black.....	3	18	3	48	720	
8	No Manure.....	No Manure	¼	14	4	36½	547½	
9	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,						
	10 lbs. Kainit,	150 lbs. Kainit,						
	13 lbs. Dis. Bone Black.	195 lbs. Dis. Bone Black..	12	21	1	68	1020	Suffered from drouth.
10	20 lbs. Floats.....	300 lbs. Floats.....	1	19	4	48	720	
11	6 lbs. Sul. Ammonia.	90 lbs. Sul. Ammonia,						
	20 lbs. Floats.....	300 lbs. Floats.....	5	30	3	76	1140	
12	No Manure.....	No Manure.....	½	19	5	49	735	
13	53 lbs. green Cotton seed	795 lbs. green Cotton Seed.	1½	27	4	65	975	
14	20 lbs. Floats,	300 lbs. Floats,						
	53 lbs. green cotton seed	795 lbs. green Cotton Seed.	4	30	3	74	1110	
15	265 lbs. Stable Manure..	3,975 lbs. Stable Manure..	9	26	½	71	1065	[any. Suffered from drouth almost as badly as

Note.—Comparing results from plots 4, 8 and 12 it will be seen that there was lack of uniformity in the quality of the soil in favor of the fertilzers adjacent to number 12.

EXPERIMENT OF MR. M. A. BISHOP, MADISON, MADISON COUNTY.

Soil—Deep red, with stiff, red subsoil; the typical red soil of the Tennessee Valley. Mr. Bishop says the soil is "destitute of gravel," and has only "a trace of sand."

"It has been planted in cotton twenty-four years consecutively, and vegetable matter apparently, entirely exhausted from it. No fertilizer of any kind had ever been applied to the land previous to 1890. Twenty years ago the land produced in favorable seasons 800 lbs. seed cotton per acre without manure.

"A perfect stand was secured May 10th. May 22nd, sided with Barton harrow—fine season in the ground. May 31st, chopped to two stalks every two feet. June 17th, cultivated shallow with Syracuse stock cultivator, run twice to the row and thinned to one stalk every two feet—195 stalks to the test rows. Cultivated every two weeks with cultivator or sweep until July 17th, when rain stopped all farm work for the season.

"The early part of the season was unfavorable on account of cold nights in May. June was dry but otherwise favorable. Rains commenced July 13th and continued till August 20th, causing the cotton to shed.

"Farmers from every portion of the county visited and inspected the crop during the growing season. All were forcibly struck with plots 6, 9, 14 and 15, which showed favorably throughout the season."

The results of this experiment indicate the need of phosphoric acid in the land under investigation, as shown in plots to which the disolved bone black was applied. It indicates also the need of nitrogen and potash as shown by the increased productive power of the dissolved bone black, when combined with these, over its use alone. The nitrogen and potash, however, though needed, were powerless without phosphoric acid. See plots 1, 3, and 5, and compare them with 6, 7 and 9. Cultivators of red valley lands may profit by an examination of these results.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 20.	Lbs. Cotton, 2nd picking. Oct. 31.	Lbs. Cotton, 3rd picking. Nov. 22.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia....	90 lbs. Sul. Ammonia...	.....	4	2¾	6¾	202½	Height 2½ ft., foliage dark green, fruit small and scattering, 3 weeks late in blooming, branches small.
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black.	4	3¾	.....	7¾	232½	Height 2 ft., green foliage, good stalks, formed well, but shedded during wet weather in Aug., bloomed early.
3	10 lbs. Kainit.....	150 lbs. Kainit.....	3	3½	....	6½	195	Stalk small, 16 in., foliage yellow, fruit small.
4	No Manure.....	No Manure.....	.....	3	1	4	120	Stalks 14 to 16 in. high, very yellow, retained the forms, late, some unmatured at frost, like No. 1.
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	3	3	¼	6¼	187½	Height 16 to 18 ins., foliage yellow, fruit medium, grew late, matured slowly.
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black.	14	7	.....	21	630	Height 2 ft., early fruit, good size, foliage green, good stalk, shedded some during the wet weather in July & Aug.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis. Bone Black.	14	7	....	21	630	Growth resembled No. 6 at all stages, result equal.
8	No Manure.....	No Manure.....	....	3½	1½	5	150	The growth of Nos. 4, 8 and 12 was about the same, only No. 4 was short by accident a few hills which is shown in yield.
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black.	16	7½	.....	23½	705	Height 2½ ft., foliage dark green, very stockey, first to bloom, fruit large, retained it well, matured early.
10	20 lbs. Floats.....	300 lbs. Floats	3½	2	2	7½	225	Height 18 in., foliage light, rather late, grew until frost, few bolls frosted.
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	7½	5	3	15½	465	Growth like No. 10, retained its fruit well but rather late, some green fruit when frost came.
12	No Manure.....	No Manure.....	.....	3½	1½	5	150	Like No. 8.
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed	9	5	2	16	480	Height 2½ ft , foliage dark green, fruit not so thick, set as Nos. 15 and 9, later on all matured, started slow, caught up.
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed	11	5	1	17½	525	Appearance like No. 13, only started off more promptly. All matured in Oct , good picking Sept. 15th.
15	265 lbs. Stable Manure...	3,975 lbs. Stable Manure.	16½	7	.....	23½	705	The appearance of No. 9 only 2 or 3 days earlier.

EXPERIMEMT OF MR. G. W. COMPTON, DIXON'S MILLS, MARENGO COUNTY.

Soil—Sandy, with clay subsoil; has been in cultivation sixty years. Original growth, oak, hickory, dogwood and pine. The land was sown in oats in 1888 and 1889, and fertilized with 40 bushels cotton seed in 1888, and 30 in 1889. Pastured after the oats were harvested in 1889.

Preparation—Laid off rows with eight inch shovel, applied the fertilizers in these furrows; bedded with one-horse turn-plow; opened bed with scooter; sowed the seed, and covered with a board. The seed were planted 25th of April. May 6th, a good stand was up.

The cotton was *"barred off" with turn-plow May 15th and followed with 14 inch solid sweep. Chopped to a stand May 28th and plowed with solid sweep; subsequent cultivation done with wider sweeps. Seasons were good 'till August 24th, then a drouth of six weeks. "Plots to which nitrogen and phosphoric acid were applied shedded most, having most to shed." "Plots with kainit shed less because they did not have much to shed." Mr. Compton concluded his report with the remark: "Will send copy of my report to our county paper, as a good many farmers have asked me to do so. Our people seem to be very much interested in the experiment, and some have come many miles to see it, as it is a new departure in this county."

An examination of the following tabulated statement reveals the plain indication of the need of phosphoric acid in the soil under experiment.

The producing power of the phosphoric acid is, however, much increased in every instance by association with nitrogen, but not at all by adding kainit. See and compare plots two and seven with six, nine and eleven. The effect of phosphoric acid in hastening the maturity of the crop is plainly shown by the weight of the first pickings in plots two, six, seven and nine.

* "Barring off," was not included in the "directions."

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking	Lbs. Cotton, 3rd picking.	Lbs. Cotton, 4th picking.	Total yield per plot.	Total yield per acre.	Remarks.*
1	6 lbs. Sul. Ammonia	90 lbs. Sul. Ammonia...	5½	13	5½	1	25	375	Greenest all the season.
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black.	11¼	15¼	11¼	....	37¾	566¼	Greener than No. 3.
3	10 lbs. Kainit.....	150 lbs. Kainit.....	5¼	9	5¼	....	19½	292½	Yellow all the time.
4	No Manure.....	No Manure	2½	9¾	2½	....	14¾	221¼	Greener than No. 3.
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	5¾	11½	5¾	1	24	360	Not as green as No. 1.
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black.	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	22	17	22	1¼	62¼	933¾	Came up best and remained in better health.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black.	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	10¾	16¼	10¾	....	37¾	566¼	Little better than Nos. 4, 8 or 12.
8	No Manure	No Manure	4¼	11¾	4¼	....	20¼	303¾	Improved by a spot from which I dug up locust stump [about five years ago.
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black.	20¾	16½	20¾	1½	59½	892½	About same as plot No. 6.
10	20 lbs. Floats	300 lbs. Floats.....	6	14¼	6	....	26¼	393¾	Little better than Nos. 4, 8 or 12.
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	12¾	16½	12¾	¼	42¼	633¾	Not good as 9 & 6, better than where no ammonia was.
12	No Manure	No Manure	3¼	10¼	3¼	¼	16¾	251¼	Greener than No. 3.
13	18 lbs. Cotton Seed Meal.	270 lbs. Cotton Seed Meal	14½	15¼	14½	¼	44¼	663¾	First came so late I used value of green seed in meal, [fearing seed would not come up—18 lbs. meal.
14	20 lbs. Floats, 18 lbs. Cotton Seed Meal.	300 lbs. Floats, 270 lbs. Cotton Seed Meal	15	15½	15	¼	45½	682½	Used meal instead of seed—18 lbs.
15	265 lbs. Stable Manure ..	3.975 lbs. Stable Manure	9	14½	9	¼	32½	487½	Stable manure used was at least ½ pine straw & leaves

* Remarks refer to the appearance of the cotton until it was knee high.

Experiment of Mr. R. H. Cross, Letohatchie, Lowndes County.

Soils—Sandy Loam, with Yellow Clay Subsoil.

Mr. Cross says: "The area upon which the tests were made was nearly level, had been in cultivation more than sixty years, and had never been fertilized before. The soil was of the character which generally prevails in this section, viz: sandy loam with yellow clay subsoil. It had not been in cultivation for several years. This gave me a pretty good crop of grass and weeds to plow under the first of January. The acre was broken, fallowed with two-horse Avery plow, turning under the vegetation to rot. The 10th of April it was again broken with one-horse plows across the original fallow. It was then laid off into plots according to your instructions. The 2nd of May the fertilizers were distributed in furrow of a long scooter plow and covered with single Avery plows at least eight inches. The 12th of May planted with an Avery planter in Ozier silk cotton. In a few days had up a fine stand, which was preserved throughout the entire year. The land being well pulverized to a depth of ten or twelve inches, in the outset, it was only necessary to cultivate the crop with wide winged sweeps, never running them deeper than an inch. Hoed only twice—25th of May chopped to two stalks two feet apart—12th of June thinned to one stalk and quit it so far as hoeing was concerned. "Laid it by" the last of June flat and clean of grass and weeds. The seasons were very favorable, except slight drouth about the middle of July.

This soil plainly needed all three of the elements, but the effect of phosphoric acid are less marked than usual upon sandy soil while that of potash is more conspicuous than usual.

COTTON EXPERIMENTS WITH FERTILIZERS.—RESULTS.

Plot Number.	Lbs. Fertiliizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 12th.	Lbs. Cotton, 2d picking Sept 25th.	Lbs. Cotton, 3rd picking. Oct. 13th.	Lbs. Cotton, 4th picking. Nov. 12th.	Total yield per Plot.	Total yield per Acre.	REMARKS.
1	6 lbs. Sul. Ammonia...	90 lbs. Sul. Ammonia....	7	12	6	4	29	435	Average height 2½ feet. Didn't rust at all. Drouth injured it in July very little. Pods large, and well developed.
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black..	9	11	5	3	28	420	Average height 2 ft. 8 in. No perceptable change in this except it stood the drouth a little better.
3	10 lbs. Kainit.....	150 lbs. Kainit.....	10	12	6	5	33	495	Average height 2¼ feet. Stood the drouth very well. Pods large and well matured.
4	No Manure.....	No Manure.....	6	8	3	2	19	285	Average height 2 feet 2 inches. Rusted.
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	8	10	9	5	32	480	Average height 2 ft. 10 inches. Grew off nicely at first and held its own throughout.
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	9	11	12	4	36	540	Average height 3 feet. An excellent composition for our soil.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	12	13	11	6	42	630	Average h't 3 feet. The kainit evidently kept this growing and vigorous throughout the entire season.
8	No Manure.....	No Manure.....	6	4	7	2	19	285	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Bis. Bone Black..	13	14	10	6	43	645	Average height 2 feet 2 inches. Rust killed all No Manure plots dead. Av. h't 3 ft. 2 in. Grew off finely at first, and was done making earliest of any.
10	20 lbs. Floats.....	300 lbs. Floats	8	9	6	3	26	390	Average h't 2 ft. Pods well grown; no rust; drouth in July parched it severely.
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia 300 lbs. Floats.....	16	19	14	10	59	885	Av, h't 3½ ft, Seems best composition for our soil.
12	No Manure.....	No Manure.....	6	9	4	1	20	300	Average height 2 feet. Rusted.
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	16	13	10	4	43	645	Average height 3 feet 2 inches. Made on after all other plots seemed done.
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed.	12	7	6	2	27	405	Average h't 2 ft. 10 in. Plot 15 seemed to injure this, it fired badly in July, same as plot 15.
15	265 lbs. Stable Manure....	3,975 lbs. Stable Manure..	7	8	6	2	23	345	Average height 3½ ft. Parched badly in July.

EXPERIMENT OF MAJ. E. M. DAVIS, PRATTVILLE, AUTAUGA, CO.

Soil—Red Sandy, with Stiff Clay Sub-soil.

This experiment was in part vitiated by previous applications of manure, as is explained by Mr. Davis as follows:

"You notice that No. 1 is better than No. 2, and that No. 2 is better than No. 3, and then No. 4, without manure, is better than any of them. This I account for in this way: I had last year a compost heap of about ten or twelve feet in diameter on the land, where I had composted cotton seed, stable manure and acid phosphate, and plot No. 4 ran right through that spot, and I found that the cotton grew much larger and was much better there than anywhere else. No. 5 also got some of the benefit of that spot. Then Nos. 7 and 8 ran through a spot where I had a similar heap two years before. The last unmanured plot, No. 12, as compared with the plots immediately around it, is about the only correct list that I had. None of the plots, from eight up, had any advantage of any excess of manure for the past two years. The whole acre was manured in checks, 3 feet by 3 feet, for two years previous to 1890.

"What astonished me most is that No. 15, with such an application of stable manure, is not as good by a little over 100 lbs. as No. 12 without manure, though I noticed that that plat grew off more rapidly than the others at the start and seemed to quit earlier. All of the manured plots quit fruiting earlier than the unmanured plots. The manured plots seemed to have been affected more by a little dry spell in July than those without manure.

"I conclude from this experiment that my land doesn't need any kainit and not much acid phosphate; that is, unless the phosphate is combined with a good share of nitrogen. No. 6, you observe, is the best plot. No. 9, which has the same manure as No. 6, with kainit added, is not so good.

"The floats seem to be a poor form of phosphate, as it seems to have been a disadvantage.

"Another thing I think I have proved, and that is that a thin stand is not better than a thick one. The outside rows of the plots were not thinned to one stalk, as the test rows were, but two stalks were left to the hill, wherever there were two, and I gathered 74 lbs. cotton more from the outside rows than from the test rows, making a difference of 148 lbs. to the acre in favor of the thick stand.

"I wish you would send me the cost of the different fertilizers

used, so that I can tell the actual advantage that one has over another."

Mr. Davis was unfortunate in the selection of his soil for experiment. Besides the influence of the compost heaps, the whole having been manured for two years previous to 1890, caused an element of uncertainty in interpreting the results. Since nitrogen disappears from the soil more promptly than phosphoric acid the influence of the residue from previous applications would supply more of the latter than the former, and hence, in the results, would be misleading, since the unmanured plots would not correctly measure the producing power of the unaided soil, as shown in plots 4 and 8, and would prove less favorable to applications of phosphoric acid than to those of nitrogen.

The observations mentioned in regard to the low yield from the stable manure, may be explained possibly by the injurious influence of the drouth in July, resulting from the firing effects of the manure. One of the effects of manure is to hasten growth, and the more fruit cotton produces previous to a drouth the more it suffers from its effects.

Conclusions drawn from this experiment are premature. This is especially true as regards the influence of the thickness of stand in the outside rows of the plots. The reason assigned for not using these outside rows in the test of the fertilizers, applies here. These rows have the advantage, by the spread of the roots of the plants, not only of the manure applied to them but of that applied to the adjacent plots also. This influence is often very marked in favor of the outside rows.

The prices of the chemicals used are given in this bulletin in connection with the soil test experiment made on this station.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Lbs. Cotton, 3rd picking.	Total yield per plot.	Total yield per acre.	Remarks.
			Sept. 16.	Oct. 28				
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia ...	23	13	1¼	37¼	1117½	The land was prepared and cultivated as directed in Bulletin No. 12.
2	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	19	11	1	31	930	
3	10 lbs. Kainit.....	150 lbs. Kainit	12	13½	1¼	26¾	802½	
4	No Manure.....	No Manure.....	15	21¼	1½	37¾	1132½	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit	18	23	2¼	43¼	1297½	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	25	19	1	45	1350	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black...	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	18½	15½	1½	35½	1065	
8	No Manure.....	No Manure.....	14½	18	1¾	34¼	1027½	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black.	24½	12	1¼	37¾	1132½	
10	20 lbs. Floats.....	300 lbs. Floats	12	16¾	1½	28¼	847½	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	Sept. 17. 17	11½	1¼	29¾	892½	
12	No Manure.....	No Manure.....	11½	15	1¾	28¼	847½	
13	53 lbs. Green Cotton Seed	795 lbs. Green Cotton Seed	20½	11¼	1	32¾	982½	
14	20 lbs. Floats, 53 lbs. Green Cotton Seed.	300 lbs. Floats, 795 lbs. Green Cotton Seed	20½	9	¾	30¼	907½	
15	265 lbs. Stable Maure....	3,975 lbs. Stable Manure..	16	11¼	¾	28	840	

EXPERIMENT OF MR. J. A. DAVISON, YANTLEY CREEK, CHOCTAW COUNTY. *Soil—Sandy, with some lime, Clay Sub-soil.*

The results of this experiment point to the need of phosphoric acid, the effect of which is, however, improved by the addition of nitrogen and potash in 6 and 7, but not in plot 9. As is usually the case, the activity of floats is developed by the addition of nitrogen. The effects of stable manure and green cotton seed are again disappointing.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 19.	Lbs. Cotton, 2nd picking. Oct. 10.	Lbs. Cotton, 3rd picking. Dec. 1.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia....	90 lbs. Sul. Ammonia...	14	11	2	27	810	This acre of cotton was showing up remarkably well until about the 12th July; at that time we had a cool north wind which seemed to poison the cotton, and but little has been made since that time. Commenced picking on Sept. 15th, in the afternoon, with plot No. 15, and picked up to plot No. 7 (inclusive), when there came up a very unexpected rain, and it was not dry enough to finish picking 'till Sept. 19th, when the remaining plots were picked. Besides the apparently poisonous wind, rust struck it, and also the boll-worm, both doing much damage.
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black.	17	10	1½	28½	855	
3	10 lbs. Kainit.....	150 lbs. Kainit.....	11	10	1	22	660	
4	No Manure.....	No Manure.....	8	11	1¼	20¼	607½	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	12	11	1½	24½	735	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	24	10	1	35	1050	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis. Bone Black	Sep. 15 20	13	1	34	1020	
8	No Manure.....	No Manure.....	6	12	2	20	600	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black	17	10	1	28	840	
10	20 lbs. Floats.....	300 lbs. Floats	9	12	1¼	22¼	667½	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	18	13	1	32	960	
12	No Manure.....	No Manure.....	6	11	1	18	540	
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed	12	9	1	22	660	
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed	12	12	½	24½	735	
15	265 lbs. Stable Manure...	3,975 lbs. Stable Manure	17	10	½	27½	825	

EXPERIMENT OF MR. R. M. DICK, ATTALLA, ETOWAH COUNTY.

Mr. Dick writes as follows: "Land nearly level; soil, gray sandy, 3 to 5 inches deep, with yellow sandy clay sub-soil. It has made twelve crops. First corn and then eleven cotton crops in succession, without commercial fertilizers, since 1884, and very little of other manure. Rows formerly ran east and west; the test rows were planted north and south, to give each fertilizer the benefit of manures remaining in the soil. Instructions were closely followed. The first planting, made April 29th, was destroyed by frost May 6th. Planted again May 15th; stand a little irregular (caused by east winds eight days in succession), but made reasonably uniform in all of the plots. The cultivation was thorough and shallow with harrow, sweeps and Planet, jr., cultivator. Each working was done on all the plots the same day and when the soil was in good working order. Cotton all picked from one to five p. m., perfectly dry. There was excessive moisture during June and July to August 5th. Plots Nos. 1, 2, 3 and 4 had some advantage in soil for twenty feet at the north ends of the rows. With this exception the plots were of very uniform fertility."

Description of Plants on Different Plots.

"No. 1 passed through the rains and cool nights with moderate growth, very good color, and at the end of the drouth a little yellow, throwing off but little. No. 2, vigorous grower, fine color, fruited well, but fired at the end of the drouth. No. 3, yellow cast through the entire season and grew slowly, did not fruit well but retained its fruit better than any other. No. 5, like No. 1, only more yellow through the growing season and at the end of the drouth. No. 6, the best for dry soils, fired but little.

"Bone black to push through the water and cool nights and ammonia to pull through the dry is what I tell my neighbors."

No. 7, good for damp soils—did well with excessive moisture—fired considerably. No. 9 "lead the troop" in everything until the drouth, when it fired and threw off terribly. No. 10, "if this is good for anything I have not found it out." No. 11, no better than No. 1, but a little earlier. No. 13 grew slowly throughout the season and was yellow at the close of the drouth. No. 14 more yellow than No. 13. No. 15 did a little better through the moisture than No. 6, but not so well through the drouth.

The appearance of the plants upon the different plots at the first of the months of June, July, August and September is recorded under the head of "Remarks." It will be observed that plot nine, upon which the complete manure was used, was graded No. 1 for the first three months, while No. 6, having the same manure, except the potash, ranked next during June, July and August and *one* in September. These results indicate that the soil needs phosphoric acid and nitrogen.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking. Oct. 15.	Lbs. Cotton, 2d picking. Nov. 8.	Lbs. Cotton, 3d picking. Nov. 19.	Total yield per plot.	Total yield per acre.	First bloom. July.	Remarks. Appearance of plants on the plots at the dates named grade from 1 to 11. Drouth from August the 5th to 28th.			
									June 1st.	July 1st.	Aug. 5th.	Sept. 1st.
1	6 lbs. Sul. Ammonia....	90 lbs. Sul. Ammonia...	9	10	5	24	720	14	6	7	6	2
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black	14	9	6	29	870	14	4	6	4	10
3	10 lbs. Kainit.....	150 lbs. Kainit.....	9	8	4	21	630	16	9	11	11	5
4	No Manure.....	No Manure.....	6	5	4	15	450	15	.....	.....	.....	.....
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit	90 lbs. Sul. Ammonia, 150 lbs. Kainit.	11	9	4	24	720	14	5	8	5	3
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	15	9	6	30	900	9	3	3	2	1
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis Bone Black.	9	8	4	21	630	14	7	4	7	9
8	No Manure.....	No Manure	5	4	2	11	330	16	.....	.....	.....	.....
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black.	18	7	4	29	870	6	1	1	1	11
10	20 lbs. Floats.....	300 lbs. Floats.....	6	5	2	13	390	17	No good.	.....	.....	.....
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	12	7	5	24	720	12	8	5	8	6
12	No Manure.....	No Manure.....	5	4	2	11	330	13	.....	.....	.....	.....
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed	9	6	4	19	570	12	11	10	10	8
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed	10	6	4	20	600	16	10	9	9	7
15	265 lbs. Stable Manure...	3,975 lbs. Stable Manure	14	10	6	30	900	12	2	2	3	4

EXPERIMENT MR. R. T. EWING, CENTRE, CHEROKEE COUNTY.

Soil—Black Sandy, with Stiff Red Clay Sub-soil.

Preparation.—The land was thoroughly broken with scooter 20th March, and again with same plow 20th April and harrowed. May 7th and 8th applied the fertilizer, bedded, harrowed off the beds and planted Jones' improved seed. As soon as the cotton was up harrowed three times. June 9th, sided with scooter and scrape and chopped to two stalks, two feet apart. June 10th, after cultivation done with scooter, scrape and hoe. July 2d, counted stalks and got 102 to each test row. Completed the cultivation August 2d with harrow. A drouth of six weeks, commencing 20th June, injured the cotton somewhat. There was then too much rain until October 1st. This caused excessive growth of weed. No difference could be discovered in the appearance of the plants upon the different plots at any time during their growth. The stalks averaged from $3\frac{1}{2}$ to 4 feet in height.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number.	Lbs. Fertilizers per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st. picking. Oct. 1.	Lbs. Cotton, 2nd picking. Nov. 1.	Total yield per Plot.	Total yield per Acre.	REMARKS.
1	6 lbs. Sul. Ammonia....	90 lbs. Sul. Ammonia....	33	16	49	735	
2	13 lbs. Dis. Boue Black..	195 lbs. Dis. Bone Black..	32	17	49	735	
3	10 lbs. Kainit.....	150 lbs. Kainit.....	30	25	55	825	
4	No Manure.....	No Manure.....	24	29	53	795	
5	6 lbs. Sul. Ammonia 10 lbs. Kainit.....	90 lbs. Sul. Ammonia 150 lbs. Kainit.....	33	38	71	1065	
6	6 lbs. Sul. Ammonia 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia 195 lbs. Dis. Bone Black..	30	30	60	900	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	36	24	60	900	
8	No Manure.....	No Manure.....	27	27	54	810	
9	6 lbs. Sul. Ammonia 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia 150 lbs. Kainit, 195 lbs. Dis. Bone Black..	39	32	71	1065	
10	20 lbs. Floats.....	300 lbs. Floats	32	17	49	735	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia 300 lbs. Floats.....	35	17	52	780	
12	No Manure.....	No Manure.....	27	18	45	675	
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	33	23	56	840	
14	20 lbs. Floats..... 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed.	33	19	52	780	
15	265 lbs. Stable Manure....	3,975 lbs. Stable Manure..	44	15	59	885	

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number.	Lbs. Fertilizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking. Aug. 12th.	Lbs. Cotton, 2nd picking. Aug. 20th.	Lbs. Cotton, 3rd picking. Aug. 30th.	Lbs. Cotton, 4th picking, Oct. 20th.	Total yield per Plot.	Total yield per Acre.	Remarks.
1	6 lbs. Sul. Ammonia...	90 lbs. Sul. Ammonia....	3	6	10	11	30	450	About the centre of No. 1, what we call a "wet-weather spring" commenced on the 10th of June; thereby about half made nothing. This hurt No. 2 some, and No. 3 a little, otherwise, this has been a fair experiment.
2	13 lbs. Dis. Bone Black.	195 lbs. Dis. Bone Black.	4	10	15	22	51	765	
3	10 lbs. Kainit.....	150 lbs. Kainit.....	11	14	20	26	71	1065	
4	No Manure.....	No Manure.....	8	12	13	21	54	810	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	6	13	21	28	68	1020	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black.	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	10	11	13	14	48	720	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black.	150 lbs. Kainit, 195 lbs. Bone Black.....	9	12	18	16	55	825	
8	No Manure.....	No Manure.....	11	13	18	18	60	900	EXPERIMENT OF MR. J. M. ELLISON. *Creek Stand, Macon county.* *Soil—Sandy, with sandy subsoil.* Mr. Ellison describes the land used in this experiment as "trod land." The results indicate a want of uniformity in the quality of the soil, which possibly resulted from an irregular distribution of the manure previously applied.
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black.	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black..	13	16	25	24	78	1170	
10	20 lbs. Floats.....	300 lbs. Floats.....	7	11	15	15	48	720	
11	6 lbs. Sul. Ammonia. 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	10	14	20	18	62	930	
12	No Manure.....	No Manure.....	8	9	15	10	42	630	
13	53 lbs. green Cotton seed	795 lbs. green Cotton Seed.	10	15	25	47	97	1455	
14	20 lbs. Floats, 53 lbs. green cotton seed	300 lbs. Floats, 795 lbs. green Cotton Seed.	8	15	20	23	66	990	
15	265 lbs. Stable Manure..	3,975 lbs. Stable Manure..	12	18	25	25	80	1200	

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Lbs. Cotton, 3rd picking.	Lbs. Cotton, 4th picking	Total yield per plot.	Total yield per acre.	Remarks.
			Sept. 15	Sept. 26	Oct. 15	Oct. 25			
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia....	3	3	4½	4	29	435	Experiment by Dr. John Gordon, Healing Springs, Washington County.
			Sept. 2	Sept. 15	Sept. 26	Oct. 15			
2	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	6¼	7¾	5	3½	45	675	
			Sept 9	Sept. 15	Sept. 26	Oct. 20			
3	10 lbs. Kainit.....	150 lbs. Kainit.....	1½	1½	3	7	26	390	*Soil—Blended Sandy and Lime.*
			Sept. 15	Sept. 26	Oct. 17	Oct. 20			
4	No Manure.....	No Manure.....	2¾	3½	5½	7	37½	562½	The soil seemed to lack uniformity, as indicated by the unmanured plots. Dr. Gordon writes: "The cotton did not have a fair showing; the season did not suit it and the land was too wet."
5	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,	Sept. 2	Sept. 18	Oct. 21				
	10 lbs. Kainit.....	150 lbs. Kainit	3¼	4¼	5	.....	25	375	
6	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,	Sept. 2.	Sept. 18	Sept. 26	Oct. 24			
	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	5¼	6	1¾	7	40	600	
7	10 lbs. Kainit,	150 lbs. Kainit,	Sept. 18	Oct. 24					
	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black..	5	8½	.....	.....	27	405	
			Oct. 24						
8	No Manure.....	No Manure.....	2¾	.....	.....	.....	5½	82½	
9	6 lbs. Sul. Ammonia,	90 lbs Sul. Ammonia,							
	10 lbs. Kainit,	150 lbs. Kainit,							
	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	Sept. 3	Sept. 18	Oct. 25				
			2¼	4	9	.....	30½	457½	
			Sept. 3	Sept. 19	Oct. 27				
10	20 lbs. Floats.....	300 lbs. Floats.....	¾	5	9½	.....	30½	457½	
11	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,	Sept. 4	Sept. 19	Oct. 27				
	20 lbs. Floats.....	300 lbs. Floats.....	2¼	5	9½	.....	33½	502½	
			Sept. 9	Sept. 19	Oct. 27				
12	No Manure.....	No Manure	1½	2	5½	.....	18	270	
			Sept. 4	Sept. 19	Oct. 27				
13	53 lbs. Green Cotton Seed.	795 lbs. Green Cotton Seed	5¼	9½	9¾	.....	49	735	
14	20 lbs. Floats,	300 lbs. Floats,	Sept. 5	Sept. 19	Oct. 27				
	53 lbs. Green Cotton Seed.	795 lbs. Green Cotton Seed	9	12¾	11¾	.....	67	1005	
			Sept. 9	Sept. 20	Oct. 27				
15	265 lbs. Stable Manure...	3,975 lbs. Stable Manure..	4	5½	7¾	.....	34½	517½	

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number.	Lbs. Fertilizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 19th.	Lbs. Cotton, 2nd picking. Nov. 1st.	Total yield per Plot.	Total yield per Acre.	REMARKS.
1	6 lbs. Sul Ammonia....	90 lbs. Sul. Ammonia....	12	10	22	660	EXPERIMENT OF MR. J. M. HOBDY,
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black..	9	14½	23½	705	LOUISVILLE, BARBOUR CO.
3	10 lbs. Kainit.....	150 lbs. Kainit	7	17	24	722	
4	No Manure.....	No Manure.....	7	12	19	570	*Soil—Sandy—Subsoil red-sandy.*
5	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia					Second growth, pines; had been cleared a few
	10 lbs. Kainit	150 lbs. Kainit.....	12	24	36	1080	years before and cultivated in corn and oats previous
6	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,					to 1890.
	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black..	22	11	33	990	The 1st planting was partly destroyed by cut-worms.
7	10 lbs. Kainit,	150 lbs. Kainit,					Planted second time May 13th, and secured a good
	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black..	10½	22½	33	990	stand. Cultivated shallow throughout.
8	No Manure.....	No Manure.	7½	10	17½	525	This land seems to have been quite uniform and to
9	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,					have needed all three of the important elements.
	10 lbs. Kainit,	150 lbs. Kainit,					
	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black..	18½	22½	41	1230	
10	20 lbs. Floats	300 lbs. Floats	7½	11	18½	555	
11	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,					
	20 lbs. Floats	300 lbs. Floats	12½	13	25½	765	
12	No Manure.....	No Manure.....	6½	11	17½	525	
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	12	16	28	840	
14	20 lbs Floats.....	300 lbs. Floats,					
	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	14	17	31	930	
15	265 lbs Stable Manure	3,975 lbs. Stable Manure..	25	15	40	1200	

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	MIDDLE ROWS OF THE PLOTS: Lbs. Cotton, 1st picking. Sept. 16.	Lbs. Cotton, 2nd picking. Oct. 9.	Lbs. Cotton, 3rd picking. Oct. 25.	Lbs. Cotton, 4th picking. Nov. 13.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia ...	5½	9	6¾	3	24½	735	Experiment of Mr. S. M. Hall, Hackleburgh, Marion County.
2	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black .	7	14	5¼	2½	28¾	862.2	
3	10 lbs. Kainit.....	150 lbs. Kainit	5½	8	5¼	3½	22¼	667.2	
4	No Manure.....	No Manure.....	4	7	4½	3¾	19¼	577.2	*Soil—Clayey with dark sandy sub-soil.*
5	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,							Mr. Hall gathered the outside and middle rows separately and has reported the weights of both. He reports that plots 9 and 10 were somewhat injured by excessive rains. There was plainly a mistake made, however, in reporting results from plot 9 of the middle rows. The yield of the outside rows is given as 832½ lbs. seed cotton per acre, while that from the inside rows on the same plot is only 367½ lbs.
	10 lbs. Kainit.....	150 lbs. Kainit	5	10	5¼	2½	22¾	682 2	
6	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,							
	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	12	11	4¾	3	30¾	922.2	
7	10 lbs. Kainit,	150 lbs. Kainit,							
	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	9½	5	3½	2½	19½	585	
8	No Manure.....	No Manure.....	3	7	4¼	2½	16¾	502.2	
9	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,							
	10 lbs. Kainit,	150 lbs. Kainit,							
	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	2	5	3¼	2	12¼	*367½	
10	20 lbs. Floats.....	300 lbs. Floats.....	3½	5¼	4¼	2¼	15¼	457.2	Attention is invited to the difference in yield of the outside and middle rows in the unfertilized plots. The plants on the adjacent fertilized rows start off more vigorously than the unfertilized, their roots spread proportionately and thus overshadow, as it were, the more feeble unfertilized plants.
11	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,							
	20 lbs. Floats.....	300 lbs. Floats..	3	8½	4	2	17½	525	
12	No Manure.....	No Manure	3½	9	4	3	19½	585	
13	53 lbs. green Cotton Seed	795 lbs. green Cotton Seed.	6½	7	4	2½	20	600	
14	20 lbs. Floats,	300 lbs. Floats,							
	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	9	9½	7½	3½	29½	885	
15	265 lbs Stable Manure ..	3,975 lbs. Stable Manure..	5	14½	5¾	4¾	30	900	

* Evidently a mistake.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	OUTSIDE ROWS OF PLOTS. Lbs. Cotton, 1st picking. Sept. 16.	Lbs. Cotton, 2nd picking. Oct. 9.	Lbs. Cotton, 3rd picking. Oct. 25.	Lbs. Cotton, 4th picking. Nov. 13.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia....	5	9	6¾	4½	25	750	
2	13 lbs. Dis. Bone Black...	195 lbs. Dis. Bone Black..	5½	11	5¼	3	24¾	742.2	
3	10 lbs. Kainit.....	150 lbs Kainit	4.3	6	5¼	3¼	19¼	577 2	
4	No Manure.	No Manure....	3	5½	4½	2½	15½	465	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit	5	8¼	5¼	2¾	21¼	637.2	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black..	11½	11	4¾	3	30¼	907.2	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black...	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	8	9¾	3½	2½	23¾	712.2	
8	No Manure.	No Manure.....	2¾	5½	4¼	3	15½	465	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black..	12½	10	3¼	2	27¾	832.2	
10	20 lbs. Floats.....	300 lbs. Floats	2¼	4½	4¼	2	13	390	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	2½	4½	3¾	2½	13¼	397 2	
12	No Manure.	No Manure.	2¾	5	4	3½	15¼	457.2	
13	53 lbs. green Cotton Seed	795 lbs. green Cotton Seed.	5¾	7	4	3	19¾	592 2	
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed.	6	12	7½	5½	31	930	
15	265 lbs. Stable Manure....	3,975 lbs. Stable Manure..	8	13½	5¾	5	32¼	967 2	

EXPERIMENT OF MR. JOHN C. KILLEBREW—*Newton, Dale county.—Soil—Sand and clay, mixed with clay subsoil six inches below the surface.* The land was old and worn in 1866, when he came into possession of it and has not been specially improved since. Peterkin cotton was planted. This variety has small seed, and, hence, does not yield as much weight in seed cotton in proportion to lint as other varieties. This soil seems to have needed all of the three principal elements, but more especially nitrogen.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number.	Lbs. Fertilizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Total yield per Plot.	Total yield per Acre.	REMARKS.
1	6 lbs. Sul. Ammonia...	90 lbs. Sul. Ammonia....	13	8	21	630	Foliage green; growth large; fruit scattering.
2	13 lbs. Dis. Bone Black.	195 lbs. Dis. Bone Black.	11½	7	18½	555	Not so green, and one-fourth smaller.
3	10 lbs. Kainit.....	150 lbs. Kainit.....	8⅓	7¾	16½	495	
4	No Manure.....	No Manure.....	7½	5¼	12¾	382½	Alike in foliage and color.
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit.....	10	13½	23½	705	Greener, and continued so longer than 3 and 4.
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black.	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black.	16	7½	23½	705	Rusted or burned badly.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black.	150 lbs. Kainit, 195 lbs. Bone Black.....	9½	8	17½	525	
8	No Manure.....	No Manure.....	5¼	4¾	10	300	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black.	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black..	12	8¼	20¼	607½	
10	20 lbs. Floats.....	300 lbs. Floats.....	7	5½	12½	375	
11	6 lbs. Sul. Ammonia. 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	8½	7	15½	465	
12	No Manure.....	No Manure.....	4	6	10	300	
13	53 lbs. green Cotton seed	795 lbs. green Cotton Seed.	10¾	12¼	23	690	Continued green and growing after all others except No. 1, were dead.
14	20 lbs. Floats, 53 lbs. green cotton seed	300 lbs. Floats, 795 lbs. green Cotton Seed.	9½	10½	20	600	

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 11.	Lbs. Cotton, 2d picking. Oct. 10.	Lbs Cotton, 3d picking. Nov. 18.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia ...	90 lbs. Sul. Ammonia. .	5	22	4½	31½	945	Experiment of Mr. W. H. Miller, Union, Greene County.
2	13 lbs. Dis. Bone Black.	195 lbs. Dis. Bone Black	9	22	10	41	1230	
3	10 lbs. Kainit	150 lbs. Kainit.....	4	19	6	29	870	*Soil—Sandy with Clay Sub-Soil.*
4	No Manure	No Manure	4	16	7	27	810	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit	90 lbs. Sul. Ammonia, 150 lbs. Kainit.	7	17	7	31	930	The land has been cleared for more than fifty years—has been "steadily brought up for past five years." Cultivated in oats in 1889, fertilized with
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	10	21	8	39	1170	30 bushels cotton seed per acre.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black.	150 lbs. Kainit, 195 lbs. Dis Bone Black	8	20	11	39	1170	*Cultivation*—Shallow, with heel scrape. Seasons, good except "short windy spell first of August,
8	No Manure	No Manure	4½	17	6	27½	825	lasting two weeks." The cotton grew steadily
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black	7	20	11	38	1140	from the start, until frost killed the leaves first week in November. The production of the unmanured plots indicates great uniformity in fertil-
10	20 lbs. Floats	300 lbs. Floats.	3	22	4	29	870	ity. The results from plots 2, 6, 7 and 9 indicate
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia, 300 lbs. Floats ...	4	21	8	33	990	that phosphoric acid was needed more than nitrogen or potash Plots 1 and 5 indicate that nitrogen
12	No Manure	No Manure	3½	18	5	26½	795	was needed, but could be only partially utilized
13	53 lbs. green Cotton Seed	795 lbs. green Cotton Seed	6	25	14	45	1350	without phosphoric acid. Potash seems to have
14	20 lbs. Floats, 53 lbs. green Cotton Seed	300 lbs. Floats, 795 lbs. green Cotton Seed	9	25	14	48	1440	been in good supply in the soil. The results from cotton seed and stable manure were more than
15	265 lbs. Stable Manure	3,975 lbs Stable Manure	10	27	17	54	1620	satisfactory.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 15.	Lbs. Cotton, 2d picking. Nov. 5.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia.....	90 lbs. Sul. Ammonia....	50	16	66	990	
2	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black	38	18	56	840	
3	10 lbs. Kainit.....	150 lbs Kainit	40	8	48	72	
4	No Manure.....	No Manure.....	35	10	45	675	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit.....	90 lbs. Sul. Ammonia, 150 lbs. Kainit	55	16	71	1065	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	65	14	79	1185	
7	10 lbs. Kainit, 13 lbs Dis. Bone Black ..	150 lbs. Kainit, 195 lbs. Dis. Bone Black	58	18	76	1140	
8	No Manure.....	No Manure.....	45	10	55	825	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black...	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black..	75	10	85	1275	
10	20 lbs. Floats.....	300 lbs. Floats	95	22	117	1755	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats.....	90 lbs. Sul. Ammonia, 300 lbs. Floats.....	75	12	87	1305	
12	No Manure.....	No Manure.....	47	8	55	825	
13	53 lbs. green Cotton Seed	795 lbs. green Cotton Seed.	85	30	115	1725	
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed.	60	22	82	1230	
15	265 lbs. Stable Manure....	3,975 lbs. Stable Manure..	55	11	66	990	

Experiment of Mr. Wm. Martin,

Greensboro, Hale county.

Soil.—Sandy loam with clay subsoil.

The results in this experiment indicate a need of nitrogen. Those in plots 2 and 10 are contradictory. Possibly some unobserved local cause affected the yield on No. 10.

While the results are very satisfactory as to yield of cotton, they present several very unsatisfactory answers, difficult of interpretation.

Experiment of Mr. W. H. Newman, Uniontown, Perry County.

Soil—"Black Slough Bottom" Land.

The land, the previous season, had grown a crop of wheat, without manure, and then a crop of peas, which were cut for hay. The plots were "flushed" the first of December, 1889, and bedded in January, 1890, to four foot rows. The fertilizers were applied in the drill April 8th, and the seed were planted the same day with a planter.

The plots were cultivated with the hoe and heel scrape, being hoed only once after chopping. Each plot was chopped from eighteen to twenty inches. There was only a slight difference in yield by pickings. The plots were picked four times, and each picking weighed. The fertilizers did not have any effect in hastening the maturity or increasing the yield. There was no difference in the appearance of the plots; the unmanured plots producing as large and as vigorous plants as the manured. The increased yield did not pay for the fertilizers. The yield of each plot is given in the table. Sul. ammonia and dissolved bone black produced the largest yield, and floats the least. The Sul. ammonia seemed to increase the yield, except when applied with kainit. Kainit reduced the yield, except when applied with ammonium sulphate and dissolved bone black. The floats also reduced the yield.

COTTON EXPERIMENT WITH FERTILIZERS--RESULTS.

	Fertilizers.	Lbs. of Lint.	Lbs. of Seed.	Lbs. of Seed Cotton.
1	90 lbs. Sul. Ammonia	513¾	1278¾	1792½
2	195 lbs. Dis. Bone Black	510	1233¾	1743¾
3	150 lbs. Kainit	450	1068¾	1518¾
4	No Manure	495	1207½	1702½
5	90 lbs. Sul. Ammonia and 150 lbs. Kainit	491¼	1185	1676¼
6	90 lbs. Sul. Ammonia and 195 lbs. Dis. Bone Black	521¼	1237½	1758¾
7	150 lbs. Kainit and 195 lbs. Dis. Bone Black.	457½	1091¼	1548¾
8	No Manure	487½	1166¼	1653¾
9	60 lbs. Sul. Amo. x 150 lbs. Kainit x 195 lbs. Dis. B. B.	517½	1196¼	1713¾
10	300 lbs. Floats	427½	963¾	1391¼
11	300 lbs. Floats and 90 lbs. Sul. Ammonia	472½	1136¼	1608¾

Note.—Supply of cotton seed and stable manure was exhausted before the fertilizers were received—hence omission of plots 12, 13, 14 and 15.

Experiment of Mr. C. L. Newman, Athens, Limestone County.

The ground selected for the experiment was nearly level, but the half acre upon which were planted plots 7–15, inclusive, had some advantage over the other half in fertility not discovered

before planting. In the spring of 1889 the land was in oats, and in cotton in 1888. Early in April the slight growth of crab grass and rag weeds was turned under. The fertilizers were put down and bedded in the last week in April. On the first day of May the beds were harrowed twice (making them nearly level) and the seed (Peerless, from Mr. Jas. Clayton of Auburn) were put down with cotton planter. In a week there was a good stand. The plots were chopped the third week in May to two stalks two feet apart, and then plowed out with an 18-inch Terrell scrape. Three weeks later it was plowed again in the same way, and then hoed and thinned to one stalk in the hill. The stand was afterwards reduced to 94 stalks to the row, that being the number of stalks in the test row with the poorest stand. The plots were hoed three and plowed four times. Each plowing was done with the Terrell scrape set to run very shallow. The plants grew off rapidly and continued in vigorous growth until killed by frost. May and June were both dry months, but the cotton seemed to be more benefitted than injured by the drouth and shed very little. Plots 8–15 did not shed so much as did plots 1–7. The early frost killed about half the bolls, but more on some plots than on others. Some of the stalks on plot 15 measured seven (7) feet and lapped across the rows so that it was difficult to pass between them. Through the entire season the acre was kept clean of grass and weeds. There were no caterpillars and very little rust; no injury from storm.

The seed were planted late and coming from a lower latitude made the crop very late. Had there been sufficient time for the full crop to mature, several of the plots would have produced at the rate of a bale to the acre, if not more.

NOTE.—Attention is invited to the correspondence between these results and those reported by Mr. Bishop of Madison county, both on typical red soil of the Tennessee Valley, badly worn.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2nd picking.	Lbs. Cotton, 3rd picking.	Total yield per plot.	Total yield per acre.	Remarks.
			Oct. 10.	Nov. 4-5	Dec.			
1	6 lbs. Sul. Ammonia	90 lbs. Sul. Ammonia	1	1	2½	4½	135	
2	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black	1½	1½	7½	10½	315	
3	10 lbs. Kainit	150 lbs. Kainit	½	1	4	5½	165	
4	No Manure	No Manure	½	1	3½	5	150	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit	90 lbs. Sul. Ammonia, 150 lbs. Kainit	1	1	2½	4½	135	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	3	2½	8½	14	420	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black	150 lbs. Kainit, 195 lbs. Dis. Bone Black	2	3	8	13	390	
8	No Manure	No Manure	1	1½	6½	9	270	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black	4	4	13	21	630	
10	20 lbs. Floats	300 lbs. Floats	1	2	10	13	390	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia, 300 lbs. Floats	2½	4	14	20½	615	
12	No Manure	No Manure	2	3	9½	14½	435	
13	53 lbs. Green Cotton Seed	795 lbs. Green Cotton Seed	3	4	11½	18½	555	
14	20 lbs. Floats, 53 lbs. Green Cotton Seed	300 lbs. Floats, 795 lbs. Green Cotton Seed	5	7	17	29	870	
15	265 lbs. Stable Maure	3,975 lbs. Stable Manure	2½	6	20	28½	855	

Experiment of Mr. J. P. Oliver, Dadeville, Tallapoosa Co.

Soil—Sandy loam, with clay subsoil.

Mr. Oliver unfortunately used the same acre upon which the experiment of 1889 was conducted, and the arrangement of plots being different in 1890, created some confusion in the results.

It will be interesting to those who have bulletin No. 12, of February, 1890—"Co-operative Soil Tests"—to compare results upon some of the plots, showing the cumulative effects of the manures. This is specially observable in plots 6, 7, 9, 11, 13, 14 and 15. Attention is invited also to plot No. 16. The experimenters of 1889 were requested to plant peas on one plot to compare the fertilizing effects of the vines left upon the soil with those of chemicals containing nitrogen. Three thousand lbs. stable manure applied in 1889, produced 1020 lbs. seed cotton. A similar additional application in 1890 on the same soil raised the production to 2100 lbs.

COTTON EXPERIMENTS WITH FERTILIZERS.—RESULTS.

Plot Number.	Lbs. Fertiliizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking.	Lbs. Cotton, 2d picking.	Lbs. Cotton, 3rd picking.	Lbs. Cotton, Lint.	Total yield per Plot, seed cot.	Total yield per Acre, seed cot.	REMARKS.
1	6 lbs. Sul. Ammonia	90 lbs. Sul. Ammonia	4	13	5	239	22	660	Broke up deep and close with 3 inch scooter
2	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black	12	20	8	430	40	1200	March 14. Put in fertilizer deep, and bedded up
3	10 lbs. Kainit	150 lbs. Kainit	12½	22	7½	451	42	1260	April 10.
4	No Manure	No Manure	2	12	10	258	24	720	Planted in Parkman big boll cotton (Texas storm proof) April 11.
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit	90 lbs. Sul. Ammonia, 150 lbs. Kainit	5	16	8	312	29	870	Harrowed with Scarbrough harrow May 9.
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	22	21	12	591	55	1650	May 19, hoed to 18 inches apart; good stand. Plowed with scrape and scootered, May 19 and 27,
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black	150 lbs. Kainit, 195 lbs. Dis. Bone Black	13	21	11	484	45	1350	June 1, 14, 28 and July 7. Hoed again and put to stand June 28.
8	No Manure	No Manure	8	19	7	365	34	1020	Good seasons all the year; too much rain part of
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Bis. Bone Black	25½	20	15½	656	61	1830	time; no rust or worms. When frost came in November, full of bolls nearly grown—lost. Plotts 1, 2, 3, 4, 7, 10 and 12 average from 3½ to
10	20 lbs. Floats	300 lbs. Floats	14	21	9	481	44	1320	four feet in height.
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia 300 lbs. Floats	20½	21	12½	580	54	1620	5, 6, 8, 9, 11, 13, 14 and 15, from 4 to six feet. Shallow cultivation all the way through, laying
12	No Manure	No Manure	6	16	9	333	31	930	by on nearly a level as possible.
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	11	21	13	484	45	1350	Planting on same area as used last year accounts
14	20 lbs. Floats, 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed.	26½	24	12	672	62½	1875	for results of some of the plots.
15	265 lbs. Stable Manure	3,975 lbs. Stable Manure	30	22	18	760	70	2100	
16	Pea vines year before, 13 lbs. superphos		12½	22	15	505	49½	1485	

EXPERIMENT OF MR. Z. T. STROUD, ABERFOIL, BULLOCK COUNTY.

Mr. Stroud writes as follows: "The land selected is thin sandy soil, four feet to clay—has been planted in corn three years without fertilizer, except last year, when I put 100 lbs. cotton-seed meal per acre.

"The plows used in cultivating the crop were sweeps and scrapes, except the first plowing, when it was barred with turning plow."

(The barring with turn-plow was not according to directions from this station.)

"Weather unfavorable throughout the spring—too much rain for cotton—excessive rain from middle of May to first of June. Cotton turned red and rusty looking; shedded its bottom leaves, but afterwards came out and did well until July 4th. It then began raining again and rained frequently until the 20th of August. Cotton continued green and growing until the rains stopped and then shedded its fruit. The weather was very hot after the rains ceased."

The results of this experiment indicate a greater need of nitrogen and potash than of phosphoric acid. The former leach very promptly through such deep sandy soils.

The yield from plot nine, with the complete manure, however, compared with those upon which the chemicals were used either singly or in pairs, indicates that the soil was deficient in all three of the principal elements—nitrogen, phosphoric acid and potash. The extreme sensitiveness of the plant to changing meteorological conditions, indicate that the soil was deficient in humus. Soils are incapable of utilizing to the best advantage chemical manures without a supply of humus.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 15.	Lbs. Cotton, 2nd picking. Oct. 7.	Lbs. Cotton, 3rd picking. Nov. 3.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia	90 lbs. Sul. Ammonia	5	9	1	15	450	Land prepared according to directions in Bulletin
2	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black.	2	6	½	8½	255	No. 12. Cotton planted April 15; barred off May 2;
3	10 lbs. Kainit	150 lbs. Kainit	½	7	3	10½	315	sided up May 15; chopped out May 28; sided up
4	No Manure	No Manure	....	2½	¼	2¾	82½	May 29; split middles June 4; sided up June 14;
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit	90 lbs. Sul. Ammonia, 150 lbs. Kainit	4¾	11½	1¾	18	540	sided up June 26; laid by July 8. Number of stalks to the row 103, making 206 to the test rows.
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black.	90 lbs Sul. Ammonia, 195 lbs Dis. Bone Black.	5	4	¼	9¼	277½	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black.	150 lbs. Kainit, 195 lbs. Dis. Bone Black	2	9	2	13	390	
8	No Manure	No Manure	....	3	½	3½	105	
9	6 lbs. Sul Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black.	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black	13	10½	2	25½	768	
10	20 lbs. Floats	300 lbs. Floats	½	6½	1¾	8¾	262½	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia, 300 lbs. Floats	3	8½	1	12½	375	
12	No Manure	No Manure	¼	3	¾	4	120	
13	53 lbs green Cotton Seed	795 lbs. green Cotton Seed	5¾	8½	1½	15¾	472½	
14	20 lbs. Floats, 53 lbs. green Cotton Seed	300 lbs. Floats, 795 lbs. green Cotton Seed	5¾	9	1¼	16	480	
15	265 lbs. Stable Manure	3,975 lbs. Stable Manure	9¼	6½	1	16¾	502½	

EXPERIMENT OF MR. A. B. STEPHENS, KEENER, ETOWAH COUNTY.

Soil—Sandy, with mixed Sand and Clay Sub-soil.

Mr. Stephens accompanies his report with the following account of the cultivation of the experiment plots:

Land prepared as per directions—

May 2. Seed planted.
" 3. Rain, good season.
" 7. Fall in temperature; frost May 8th.
" 10. Warm.
" 13. Fall in temperature; rain, with some hail, which injured the stand.
" 22. Sided off and worked.
" 25. Chopped to two stalks in place.
" 26. Plowed, throwing dirt to stalk.
June 12. Thinned to one stalk.
" 16. Plowed second time.
July 4. " third time and hoed.
" 16. " fourth time and laid by.

Heavy rain June 17, damaging the land and otherwise destroying the stand, reducing the number of stalks to 72 per row.

The results indicate that the soil needs phosphoric acid especially, and that the addition of nitrogen and potash to the soil fails to increase the production without the addition of phosphoric acid also. Phosphate alone, however, finds enough nitrogen and potash to unite with it in effecting an increased production.

The effects of chemical manures upon this soil corresponds quite accurately with those observed upon the soils of this station.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number	Lbs. Fertilizers per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking. Oct. 15.	Lbs. Cotton, 2nd picking. Nov. 25.	Total yield per 2 rows.	Total yield per Acre.	REMARKS.
1	6 lbs. Sul. Ammonia ..	90 lbs. Sul. Ammonia ...	6	9½	15½	465	Bolls large, but late in maturing.
2	13 lbs. Dis. Boue Black..	195 lbs. Dis. Bone Black.	10	10½	20½	615	Slow growth; good staple.
3	10 lbs. Kainit	150 lbs. Kainit	4	8	12	360	Large stalk, but few bolls.
4	No Manure	No Manure.....	6	10½	16½	495	Small stalk, few bolls; fruit opened well.
5	6 lbs. Sul. Ammonia 10 lbs. Kainit	90 lbs. Sul. Ammonia 150 lbs. Kainit	6	10½	16½	495	Good stalk, poorly bolled.
6	6 lbs. Sul. Ammonia 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia 195 lbs. Dis. Bone Black..	22	10	32	960	Good weed; opened fairly well.
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black..	150 lbs. Kainit, 195 lbs. Dis. Bone Black..	19	8	27	810	Good weed, but opened poorly.
8	No Manure	No Manure. ...	7	8½	15½	465	Small stalk, but opened well.
9	6 lbs. Sul. Ammonia 10 lbs. Kainit, 13 lbs. Dis. Bone Black..	90 lbs. Sul. Ammonia 150 lbs. Kainit, 195 lbs. Dis. Bone Black..	26	13¾	39¾	1192½	Good weed and well fruited; good opening.
10	20 lbs. Floats	300 lbs. Floats	9	10	19	570	Large weed, but poorly opened.
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia 300 lbs. Floats...	12	9	21	630	Large weed, but few bolls.
12	No Manure.....	No Manure.....	7	8	15	450	Good weed, but late.
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	9	7	16	480	Small weed, well bolled and opened.
14	20 lbs. Floats ..... 53 lbs. green Cotton Seed.	300 lbs. Floats, 795 lbs. green Cotton Seed.	10	7	17	510	Very slow in growth; late.
15	265 lbs. Stable Manure ..	3,975 lbs. Stable Manure..	15	9½	24½	735	Good weed, but injured by drought.

Experiment of Mr. T. M. Watlington, Abbeville, Henry County.

In order to inquire into the needs of the sandy and clay soils of southeast Alabama in close juxtaposition, two sets of chemicals were furnished Mr. Watlington for experiment. Experiment No. 1 was made upon sandy soil with clay at varying distances from the surface, but no where in reach of the plow.

Experiment No. 2 was made upon what is known as clay soil with such mixture of sand at the surface as to justify the name of clay loam. The subsoil is red clay with a very slight mixture of sand. Both soils have been under cultivation for many years.

In 1889 both acres were cultivated in corn and fertilized with green cotton seed. The sandy land was remarkably uniform in quality, as indicated by the yield on the unmanured plots. The clay land of experiment No. 2 was not uniform, as shown by the fact that the yield on plots 4 and 8 is double that on 12.

The indications point to the need of all three of the elements, nitrogen, phosphoric acid and potash.

COTTON EXPERIMENT WITH FERTILIZERS—RESULTS.

Plot Number.	Lbs. Fertilizer per Plot.	Lbs. Fertilizer per Acre.	Lbs. Cotton, 1st picking. Sept. 5th.	Lbs. Cotton, 2nd picking. Sept. 30th.	Lbs. Cotton, 3rd picking. Oct. 16th.	Total yield per Plot.	Total yield per Acre.	REMARKS.
1	6 lbs. Sul Ammonia	90 lbs. Sul. Ammonia ..	12	8	4	24	720	Acre No. 1 sandy land.
2	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black..	10	6	3¾	19¾	592½	Commenced to rust Aug 6.
3	10 lbs. Kainit	150 lbs Kainit	5	8½	3¾	17¼	517½	
4	No Manure.	No Manure.....	4	5	½	9½	285½	
5	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia						
	10 lbs. Kainit	150 lbs. Kainit	10	8¼	1¼	19½	585	
6	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,						
	13 lbs. Dis. Bone Black..	195 lbs. Dis. Bone Black	13¾	5	4	22¾	682½	
7	10 lbs. Kainit,	150 lbs Kainit,						
	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black.	5	8½	2	15½	465	
8	No Manure..... ..	No Manure.	3	7	¾	10¾	322½	
9	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,						
	10 lbs. Kainit,	150 lbs. Kainit,						
	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black..	14½	10	2½	27	810	
10	20 lbs. Floats	300 lbs. Floats	5	7	3	15	450	
11	6 lbs. Sul. Ammonia,	90 lbs. Sul. Ammonia,						
	20 lbs. Floats	300 lbs Floats	4	12	1½	17½	525	
12	No Manure	No Manure....	1½	9	.....	10½	315	
13	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	8	10¼	5	23¼	697½	
14	20 lbs Floats	300 lbs. Floats.						
	53 lbs. green Cotton Seed.	795 lbs. green Cotton Seed.	10¼	14	4	28¼	847½	
15	265 lbs Stable Manure ..	3,975 lbs. Stable Manure	13	13¾	6¼	33	990	

COTTON EXPERIMENT WITH FERTILIZERS - RESULTS.

Plot No.	Pounds Fertilizer per Plot.	Pounds Fertilizer per Acre.	Lbs. Cotton, 1st picking, Sept. 12.	Lbs. Cotton, 2nd picking Oct. 10.	Lbs. Cotton, 3rd picking, Nov. 3d.	Total yield per plot.	Total yield per acre.	Remarks.
1	6 lbs. Sul. Ammonia	90 lbs. Sul. Ammonia.	11	14	6¼	31¼	937½	
2	13 lbs. Dis. Bone Black	195 lbs. Dis. Bone Black.	13½	16	7	36½	1095	Acre No. 2, clay land.
3	10 lbs. Kainit	150 lbs. Kainit.	9	15½	5¼	29¾	892½	
4	No Manure	No Manure	8	14	2	24	720	
5	6 lbs. Sul. Ammonia, 10 lbs. Kainit	90 lbs. Sul. Ammonia, 150 lbs. Kainit.	10	15	4	29	870	
6	6 lbs. Sul. Ammonia, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 195 lbs. Dis. Bone Black	21¼	18¼	8	37½	1125	
7	10 lbs. Kainit, 13 lbs. Dis. Bone Black.	150 lbs. Kainit, 195 lbs. Dis. Bone Black.	9	16	7½	32½	975	
8	No Manure	No Manure	5	12	5	22	660	
9	6 lbs. Sul. Ammonia, 10 lbs. Kainit, 13 lbs. Dis. Bone Black	90 lbs. Sul. Ammonia, 150 lbs. Kainit, 195 lbs. Dis. Bone Black	18	18½	6	42½	1275	
10	20 lbs. Floats	300 lbs. Floats.	5	13	4½	22½	675	
11	6 lbs. Sul. Ammonia, 20 lbs. Floats	90 lbs. Sul. Ammonia, 300 lbs. Floats.	6	10	3	19	570	
12	No Manure	No Manure	2¾	6¾	1	10½	315	
13	18 lbs. Cotton Seed Meal	270 lbs. Cotton Seed Meal	9	12¾	3	24¾	742½	
14	20 lbs. Floats, 18 lbs. Cotton Seed Meal	300 lbs. Floats, 270 lbs. Cotton Seed Meal	14	15½	3¼	32¾	982½	
15	265 lbs. Stable Manure	3,975 lbs. Stable Manure.	14	16	3¾	33¾	1012½	Commenced to rust August 10.

EXPERIMENT OF THE STATE STATION, AUBURN, ALA.

For the purpose of convenient comparison, the following report of the co-operative experiment conducted at this Station is re-printed from Bulletin No. 22, recently issued:

Soil Test of Fertilizers with Cotton.

For the purpose of learning the *chemical needs* of the various soils of the State, chemicals already prepared and weighed, ready for application, were furnished thirty *volunteer experimenters* cultivating typical soils of as many sections of the State, with the request that they be applied, as far as practicable, to soil upon which no commercial or other fertilizer had ever been used.

In order to compare the soil of this station with those in the different parts of the State, the same chemicals in character and quantity were applied upon an old field which had been lying out for many years, and for the last seven closely pastured. No commercial fertilizers was ever applied to this soil previous to 1890. It had been cleared so long that even the long-leaf pine stumps had disappeared.

The plots were arranged as shown in the diagram on page 16 of this bulletin, and the experiment was the same in every respect as those already reported as conducted by local experimenters.

The manures were applied with the utmost care, and almost a perfect stand secured. The cultivation throughout was shallow and perfectly satisfactory. When the cotton was large enough to be exempt from attack by the cut worm, the stalks in the two test rows in each plot were counted and reduced to the same number in each by pulling out from those having the largest number, down to the least number found in any plot. This is the only practicable plan by which an absolutely uniform stand can be secured.

Observations were made, as shown in the table, upon the height, condition and appearance of the plants on the different plots, June 14th, July 8th, August 11th, and September 11th. The quantity gathered at the different pickings was recorded and is printed to show the effects of the different manures in hastening the growth and maturity of the crop. It will be observed, that while from some plots more than *ninety* per cent. of the crop was gathered by the 15th of October, from others less than *sixty* per cent. was gathered. This is often a very important effect of manures, since the price is usually better during September and October than later, and a laborer can gather fully one-third more per day in September than in November or December. Besides,

by reference to the table giving the average rainfall it will be observed that September and October are generally comparatively dry months, and hence favorable for maturing and gathering cotton. In order to have a check upon the accuracy of the field weights, the seed cotton from each plot was kept separate, tied up in sacks and suspended from the joist of the gin house, where it was exempt from liability to be disturbed by either men or mice. At the time of ginning, the cotton from all the plots was re-weighed under like conditions. The columns in the table headed "field weights" and gin-house weights" show the loss of each plot up to December 17th, when it was ginned. The results indicate that the soil upon which the experiment was conducted was especially deficient in phosphoric acid, since a marked increase in production results from its application in every instance, whether used alone or in combination with potash or nitrogen. The results from kainit and sulphate of ammonia used either singly or together, indicate that the plant was unable to utilize these without phosphoric acid. That the soil needed both potash and nitrogen is shown by the increased yield where these are combined with phosphoric acid.

That these, potash and nitrogen, were to some extent available in the soil is shown by the fact that phosphoric acid alone gave good results. The *indications* from the results of this experiment are, therefore, that the soil needs all three of the principal ingredients, nitrogen, potash and phosphoric acid, but is most deficient in the latter.

Attention is invited to the *per centages* of increase from the use of the different manures, as shown in the table.

It is interesting also to note the cost of fertilizers applied per acre, the actual profit and the per cent. of profit. As the profit and per cent. are calculated upon and due to the increase resulting from the fertilizers, and as all other expenses are the same on the unfertilized land as upon the fertilized, the effect of the fertilizers alone are considered.

While the stable manure produced the largest increase and the largest profit per acre, attention is called to the fact that it was applied at the rate of nearly *two tons* per acre or half a ton more than the amount annually saved from each mule kept. There is no question about the efficacy of good stable manure properly used, but the available supply is too small.

The late fall was favorable to the plots which produced little since a larger per cent. of the fruit on these was produced late in the season than upon the plots upon which the plants grew off more promptly in early summer.

COTTON EXPERIMENTS WITH FERTILIZERS—RESULTS.

Plot No.	Pounds.	Fertilizers used per Acre. Names.	Yield in Pound Seed Cotton per Acre. Field Weight. 1st Picking, Sept. 1.	2nd Picking, Sept. 17.	3rd Picking, Oct. 15.	4th Picking, Nov. 8.	5th Picking, Nov. 25.	Field weights. Total.	Ginhouse weights. Total.	Per ct. of increase over no manure.	Cost of fertilizers per acre.	Profit per acre.	Per cent. of profit.	Loss.	Per cent. of loss.	Per cent. gathered to Oct. 15th.
1	90	Sulphate Ammonia	9	33	108	75	39	264	255	.....	$ 3 30	.....	...	5 70	1 23	57
2	195	Dissolved Bone Black	183	270	141	36	18	648	624	88.4	2 53	6 59	64	....	...	92
3	150	Kainit	6	27	174	135	72	414	390	20.3	1 37	73	7	....	..	50
4	.....	No Manure	9	45	138	108	51	351	330	....	.....	.....	...		...	55
5	240	150 lbs. Kainit, 90 lbs. Sul. Ammonia	6	30	123	144	75	378	369	9.9	4 67	.....	....	3 65	55	42
6	285	195 lbs. Dis. Bone Black, 90 lbs. Sul. Ammonia	180	345	186	66	36	813	765	136 3	5 83	8 24	80	...	.	88
7	345	195 lbs. Dis. Bone Black, 150 lbs. Kainit	198	411	222	69	39	939	900	173.0	3 90	13 95	135	....	...	88
8	.....	No Manure	12	42	129	105	36	324	309	....	....	....			..	55
9	435	195 lbs. Dis. Bone Black, 90 lbs. Sul. Am., 150 lbs. Kainit	198	450	303	63	33	1047	963	204 4	7 20	13 86	134	....	..	91
10	300	Floats	81	225	162	45	24	537	510	56.1	2 36	3 43	33	..	..	87
11	390	300 lbs. Floats, 90 lbs. Sul. Ammonia	105	255	258	105	36	759	732	120 6	5 66	6 79	66		...	81
12	....	No Manure	9	66	159	93	30	357	342	....	....	....		..	....	66
13	795	Green Cotton Seed	48	228	222	69	21	588	570	71.0	3 57	3 75	36	.	..	85
14	1095	795 lbs. green Cotton Seed, 300 lbs. Floats	156	420	249	63	30	918	882	167.2	5 93	11 29	109	..	..	90
15	3975	Stable Manure	345	585	162	33	21	1146	1119	233.1	3 97	20 09	194	...	..	95

OBSERVATIONS UPON THE APPEARANCE AND CONDITION OF THE PLANTS UPON THE DIFFERENT PLOTS.

Plot Number.	Fertilized used per Acre.		June 14th.		July 8th		August 11th.			September 11th.	
	Pounds.	Names.	Condition of Plant.	Height in inches.	Condition of Plant.	Height in Inches.	Condition of Plant.	Height in Inches.	Leaf Blight.	Condition of Plant.	Leaf blight.
1	90	Sulphate Ammo.	Yellow.....	2 to 5	Yellow, not vig.	4 to 11½	Green, vigor's and fruiting rapidly...	7 to 16	Free ...	Mak'g small and vig	V'y slight
2	195	Dis. Bone Black.	D'k green & vig.	5 to 10	Col. g'd and vig.	11 to 24	Green and fruiting ended	15 to 30	Badly ..	Matured	V'y badly
3	150	Kainit	Green.....	2 to 6	" "	6½ to 14	Green, vigorous & making rapidly...	10 to 18	Free ...	Vigorous and mak'g	Free.
4	....	No manure. ..	Yellow.....	2 to 5	Yellow, not vig.	4½ to 9	"	7 to 13	"	Vigorous and mak'g.	Slight.
5	240	150 k't, 90 sul.am	Yellow.....	2 to 5	Col. g'd and vig.	4½ to 9	"	9 to 20	"	Vigorous and mak'g.	Free.
6	285	195 dis. B. Bl. 90 Sul. Ammn.	D'k gr'n and vig	4 to 8	" "	7 to 22	Vigorous and fruiting slightly	11 to 30	Slight..	Matured	Badly.
7	345	195 dis. B. B'k 150 Kainit....	" "	5 to 10	Vig.,col. little	8 to 24	"	11 to 30	Free . .	Matured.	Slight.
8	....	No manure....	Yellow	2 to 5	Yel. and not vi	1½ to 9	Vigor'us and making rapidly.....	6 to 13	Free ...	Small, vig. and mak.	V'y slight
9	435	195 dis. B. B'k. 90 sulpha. am. 150 Kainit.	Green	4 to 8	Col. g'd and vig.	1 to 22	Vigor'us and fruiting slightly.....	14 to 30	Slight. .	Matured.....	Badly.
10	300	Floats	Light Green....	2 to 6	" "	7 to 12	Vigor'us and making rapidly	11 to 24	"	Matured and small..	Badly.
11	390	300 Floats, 90 sul. ammo.	Light Green....	2 to 6	" "	8 to 15	Vigor'us and making moderately..	12 to 26	"	Matured.	Badly.
12	....	No manure.....	Yellow.....	2 to 5	Yellow not vig.	4½ to 9	Vigor'us and making rapidly.....	7 to 13	Free ...	Making	Slight.
13	795	Green cot'n seed	Yellow.....	2 to 5	Very yellow....	9 to 15	"	12 to 28	Slight..	Matured	Badly.
14	1095	795 green cot. seed, 300 floats	Light Green	2 to 6	Col. g'd and vig.	9 to 20	"	11 to 30	Slight ..	Matured.	Badly.
15	3975	Stable manure..	v'y vig. & d'k g'n	5 to 10	Col.little off&vig.	12 to 26	Fruiting ended	18 to 30	v'y sl'ht	Matured.	Badly.

LIST OF CO-OPERATIVE EXPERIMENTERS FOR 1891.

	Names.	County.	Post-Office.	Soil.	Sub-Soil.
1	Aday, L. C., Rev	Franklin	Newberg, Ala	Red cedar loam	Red clay.
2	Beasley, E. J	Covington	Red Level, Ala	Red	Clay.
3	Brown, D. L	Bibb	Randolph, Ala	Sandy	Clay.
4	Bishop, M. A	Madison	Madison, Ala	Clay loam	Stiff clay.
5	Bradley, F. W	Clarke	Walker Springs, Ala	Sandy	Clay.
6	Brannon, J. M	Russell	Seale, Ala	Sandy loam	Clay.
7	Compton, G. W	Marengo	Dixon's Mills, Ala	Sandy loam	Clay.
8	Cross, R. H	Lowndes	Letohatchie, Ala	Sandy loam	Yellow clay.
9	Davis, E. M., Maj	Autauga	Prattville, Ala	Sandy loam	Red clay.
10	Davison, J. A	Choctaw	Yantley Creek, Ala	Sandy, with some lime	Clay.
11	Dick, R. M	Etowah	Attalla, Ala	Red loam	Red clay.
12	Deer, John F	Monroe	Monroeville, Ala	Gray sandy	Clay
13	Ewing, R. T	Cherokee	Centre, Ala	Black sandy	Stiff clay.
14	Ellison, J. M	Macon	Creek Stand, Ala	Sandy	Sandy.
15	Gordon, John, Dr	Washington	Healing Springs, Ala	Gray sandy loam	Sandy clay.
16	Goodwyn, A. T	Elmore	Robinson Springs, Ala	Gray sandy	Red clay.
17	Hobdy, J. M	Barbour	Louisville, Ala	Sandy loam	Red clay.
18	Hall, S. M	Marion	Hackleberg, Ala	Dark gray	Red clay.
19	Hall, Wm. B	Lowndes	Lowndesboro, Ala	Lime prairie	Black clayey.
20	Inzer, J. T	St. Clair	Eden, Ala	Sandy loam	Red clay.
21	Johnson, Uriah	Morgan	Trinity Station, Ala	Red sandy loam	Red clay.
22	Killebrew, J. C	Dale	Newton, Ala	Sandy loam	Clay.
23	Kennedy, J. M	Clay	Oak Lone, Ala	Red	Red, stiff clay.
24	Logan, J. A	Chilton	Clanton, Ala	Mulatto and sandy	Red clay.
25	Miller, W. H	Greene	Union, Ala	Sandy	Clay.
26	Martin, Wm	Hale	Greensboro, Ala	Sandy loam	Clay.
27	Mize, J. W	Blount	Remlap, Ala	Red and sandy	Sticky clay.
28	Melton, W. B	Fayette	Davis' Creek, Ala	Gray sandy	Clay.
29	Manning, W. S	Calhoun	Oxford, Ala	Mulatto	Red clay.
30	Newman, W. H	Perry	Uniontown, Ala	Black prairie	Black clay.
31	Newman, C. L	Limestone	Athens, Ala	Clay loam	Red clay.

LIST OF CO-OPERATIVE EXPERIMENTERS FOR 1891—CONTINUED.

	NAMES.	COUNTY.	POST-OFFICE.	SOIL.	SUB-SOIL.
32	Oliver, J. P	Tallapoosa	Dadeville, Ala	Gray sandy	Clay.
33	Ott, J. C	Lauderdale	Florence, Ala	Gray, little gravelly,	Clay.
34	Pitts, J. W	Shelby	Cresswell Station, Ala.	Red clay loam	Stiff red clay.
35	Porter, T. M. J	Butler	Georgiana, Ala	Pine, light sandy	Yellow clay mixed with sand.
36	Pruitt, S. A	Pike	Chesser, Ala	Sandy	Clay.
37	Radney, J. H	Randolph	Roanoke, Ala	Sandy loam	Stiff red clay.
38	Stroud, Z. T	Bullock	Aberfoil, Ala	Light, gray	Clay.
39	Snuggs, T. A	Cullman	Holly Pond, Ala	Sandy and gravelly	Yellow, sandy.
40	Sellers, W. H	Geneva	Geneva, Ala	Sandy	Red clay and sand mixed.
41	Watlington, T M	Henry	Abbeville, Ala	Sandy	Sand and clay mixed.
42	White, W. S	Lawrence	Hattan, Ala	Clay loam	Red clay.

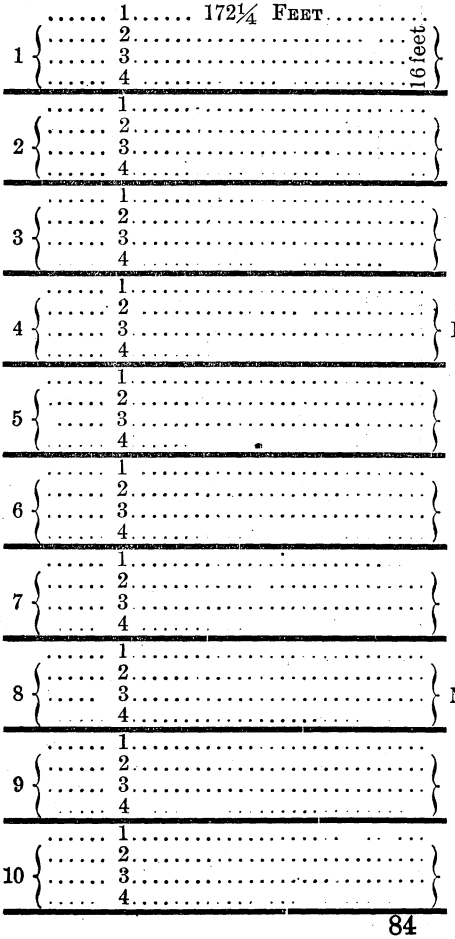
Directions for Conducting Soil Tests with Fertilizers for 1891.

Selection of Land.

The area upon which the experiment is made should be level, or nearly so; should represent, in character of soil and subsoil, the section in which the experimenter lives, should not have been fertilized for several years, or better still, never at all, but should not be new or fresh land; the object being to learn what fertilizer the ordinary cultivated lands of the section need.

Arrangement of Plots.

The accompanying diagram shows the arrangement of the plots. There will be 19 plots of 1-16 of an acre each. Each plot will be 172¼ feet long and 16 feet wide, admitting of four rows of cotton four feet apart:



11	1, 2, 3, 4	6 lbs. Nitrate Soda. 15 lbs. Floats.
12	1, 2, 3, 4	No Manure.
13	1, 2, 3, 4	53 lbs. Green Cotton Seed.
14	1, 2, 3, 4	53 lbs. Green Cotton Seed. 15 lbs. Floats.
15	1, 2, 3, 4	265 lbs. Stable Manure.
16	1, 2, 3, 4	15 lbs. Acid Phosphate. 15 lbs. Cotton Seed Meal.
17	To be planted in peas and vines turned turned in green.	
18	To be planted in peas—vines cut for hay.	
19	To be planted in peas—vines left to rot.	

The fertilizers are sent, freight prepaid, to the depot designated by each experimenter. Each package bears two labels—one showing its contents, the other the plot to which it is to be applied. As shown in the diagram, each fertilizer is to be applied to four rows. To secure an accurate distribution, divide each parcel into four equal parts, by weight, and apply one-fourth to each row. Numbers 4, 8 and 12 are to receive no fertilizer. The experimenter is expected to furnish the cotton seed for plots 13 and 14, and the stable manure for No. 15. Apply the green cotton seed in a deep furrow and distribute the floats over the seed, in plot 14. In plots 13 and 15, distribute the cotton seed and stable manure, respectively, and bed upon them as upon the fertilizers in the other plots.

Preparation.

First break the land "flush," deeply and thoroughly, after accurately measuring the area to be occupied by the experiment, viz.: 172¼ feet by 304 feet. Lay off nineteen plots 16 feet wide and 172¼ long, and then open four furrows 4 feet apart in each of these plots. In these furrows distribute the fertilizers and

bed with a good turn plow, making a high bed. Then draw a harrow or heavy brush across the beds to reduce and smooth them and prepare them for the planter. It is important to secure a perfectly uniform stand of plants, and hence the seed-beds should be thoroughly prepared.

Planting.

Use the *same kind of seed upon* the whole area, and plant all the plots the *same day.* If a part of the plots were planted before and the rest after a rain, the results of the experiment would be impaired in value. Use every precaution necessary to secure a full stand. If a uniform stand is not secured at the first planting, plow it up promptly and plant again.

Cultivation.

As soon as the plants are large enough, "side" with a scrape or sweep, and after several days, chop to "*two stalks* every *two feet.*" As soon as danger of loss by cold or cut worms has passed, reduce the stand to *one stalk* in every hill. Rows 2 and 3 of each plot are to be gathered to determine the yield from each fertilizer. This reduces the "test area" of each plot to 1–32 of an acre. One missing stalk on this area would, therefore, represent 32 to the acre. To make the experiment reliable, therefore, there must be the same number of stalks upon each such "test area." To insure this, when the plants are eight to ten inches high, count carefully the stalks in rows 2 and 3 of each plot. A perfect stand would give 86 stalks to the row, or 172 to the "test area," rows 2 and 3. Suppose, for instance, the count shows that the number of stalks range from 172, a perfect stand down to 160 to the test areas. *Reduce the number of plants to 160 in all of the test areas* (rows 2 and 3 of each plot) by pulling from each the number of stalks it was found to contain *above* 160. This is the only *reliable* way to secure uniformity of stand, without which the experiments *cannot be accurate.* Neither calculating the yield on the basis of a perfect stand, nor replanting is reliable, but both are misleading. Let all the plots be cultivated on the same day and in exactly the same manner throughout the season. See that no tree stands within 100 feet of any of the plots.

The Pia-Vine Plots.

On plots 17, 18 and 19 plant some variety of peas which produces most vine. As soon as a few pods begin to ripen turn under the vines on plot No. 17, and cut them from No. 18, and cure them for hay, weighing the hay and reporting its weight

and value with other results. When the peas ripen, gather them from No. 19, weigh accurately, and report weight and value with the cotton results. Leave the vines upon this plot until the land is prepared for cotton in 1892. The object of these three plots is to compare effects upon the crop of next year of turning under the vines, cutting them for hay, and allowing them to rot upon the land.

Since the size of the plots for 1891 is different from that of 1890, those who conducted the experiment in 1890 will select a different area from that used in 1890.

The area used in 1891 will be used again in 1892, and plots 17, 18 and 19 planted in cotton or corn.

Memoranda.

Record in a book, kept exclusively for that purpose, the time and manner of performing every operation connected with the experiment, from the preparation of the land to gathering the crop. Make weekly or bi-weekly notes of the appearance of the cotton on the different plots.

Record all changes in the weather likely to affect the growth or fruitfulness of the cotton plant, such as unusually high or low temperature, excessive rainfall or continued drouth; and note the difference, if any, in the effects upon the different plots. Keep a careful record of the "seasons" and their apparent effects upon soil and plants.

Gathering.

Before the crop matures, printed blanks upon which to record results will be furnished each experimenter.

The slightest mistake in gathering or weighing the products will destroy the value of the experiment, and the utmost care and watchfulness should be exercised to prevent such mistakes. The gathering and weighing of the product of the different plots must be done under uniform conditions.

Pickings should not be commenced until the morning dew has disappeared from the cotton. If some plots are gathered and weighed in the early morning and others in the afternoon, accuracy will be sacrificed.

Each experimenter must exercise a sound judgment in these matters of detail, looking constantly to securing perfect accuracy in the comparison of the effects of the fertilizers.

Experiments, like statistics, unless full and accurate, are misleading.

No account need be kept of the rows one and two, since they

being only four feet from the adjacent plots to which different manures were applied, receive by the spread of their roots the benefit of both fertilizers. The products of the rows two and three will be used to compare the effects of the different fertilizers. The plants in these rows being eight feet from those to which a different fertilizer was applied, only the extremeties of their longest roots will reach it, and hence, will not be materially affected by it.

Pickings should be made with sufficient frequency to avoid the risk of having the experiment vitiated by storm.

Record the weight and date of each picking. Record the average height of the stalks upon each "test area." Note the character and extent of injury to the plants by any casualty, such as storms, boll-worm, caterpiller, rust or blight.

When the plants are sufficiently advanced in growth to show plainly the effects of the fertilizers, invite the farmers of the neighborhood to inspect the plots at intervals during the season. This is important, since the object of the experiment is to benefit the farmers who cultivate lands similar in character to that upon which the experiment is made.

Cost of Fertilizers Applied per Acre.

In order that the experimenters and other farmers may better understand the inquiry made upon the different plots, the cost of the different materials used is given in the statement which follows. The calculations are made upon the cost laid down at Auburn for all of them, since the local freights upon the packages re-shipped to the depots of the experimenters would produce a false impression, since the average local rate of freight charged upon the amount sent to each experimenter from Auburn to their depots exceeds five dollars per ton. Shipped in quantity, the freight to the various depots of the experimenters would average little more than that from the factories to Auburn. Again, in estimating profits resulting from the use of the different fertilizers, it will be more convenient to have a common standard of comparison.

Quantity and Cost per Acre of Fertilizers used by Co-operative Soil Test Experimenters, 1891.

Plot 1.	96 lbs. Nitrate Soda	$	2 13
2.	240 lbs. Acid Phosphate		1 98
3.	64 lbs. Muriate Potash		1 44
4.	No manure.		
5.	96 lbs. Nitrate Soda	$2 13	
	64 lbs. Muriate Potash	1 44	3 57

Plot 6.	96 lbs. Nitrate Soda	2 13	
	240 lbs. Acid Phosphate	1 98	4 11
7.	64 lbs. Muriate Potash	1 44	
	240 lbs. Acid Phosphate	1 98	3 42
8.	No manure.		
9.	96 lbs. Nitrate Soda	2 13	
	240 lbs. Acid Phosphate	1 98	
	64 lbs. Muriate Potash	1 44	5 55
10.	240 lbs. Floats		1 88
11.	240 lbs. Floats	1 88	
	96 lbs. Nitrate Soda	2 13	4 01
12.	No manure.		
13.	848 lbs. Green Cotton seed, @ 45c. per cwt		3 81
14.	848 lbs. Green Cotton seed, " "	3 81	
	240 lbs Floats	1 88	5 70
15.	4,240 lbs. Stable manure, @ $1 per 1,000 lbs		4 24
16.	240 lbs. Acid Phosphate	1 98	
	240 lbs. Cotton Seed Meal	2 60	4 58
17.	To be planted in peas and vines turned-in green.		
18.	To be planted in peas and vines cut for hay.		
19.	To be planted in peas and vines left to rot.		

Pounds of Fertilizing Elements per Acre.

When a farmer purchases acid phosphate he pays his money for the available phosphoric acid it contains. No value is placed upon the sulphate of lime, the water or the sulphuric acid it may contain. By available phosphoric acid is meant that which is in condition to be promptly utilized by the plant. The fertilizer laws of Alabama require the vendor to guarantee the per cent. of water soluble phosphoric acid, the citrate soluble phosphoric acid and the acid soluble phosphoric acid. The corresponding terms used in other States are "soluble phosphoric acid," "reduced phosphoric acid," and "insoluble phosphoric acid." The water soluble means that which is soluble in distilled or pure water; the citrate soluble means that which is soluble in citrate of ammonia, which is supposed to have solvent power equivalent to soil water. The insoluble or acid soluble means that which is not soluble in either pure water or the water of the soil impregnated with acids and alkalies extracted from the soil and the vegetable matter it contains. Experiment, often repeated, has demonstrated that the citrate soluble and the water soluble are both promptly available to the plant, and hence are together called "available phosphoric acid," and in calculating commercial values are given the same valuation.

In the statement following the number of pounds of "available" phosphoric acid is given in one column and the insoluble in another. While the insoluble or "acid soluble" phosphoric acid has a very low valuation, when finely powdered insoluble phos-

phates are used in connection with organic matter containing nitrogen, a portion of the phosphoric acid becomes promptly available. The valuable ingredient of the nitrate of soda is nitrogen, and in muriate is potash. The nitrate of soda used in these experiments contains 15.19 per cent. of nitrogen, which is equivalent to 18.44 per cent. of ammonia. The cotton seed meal contains 7.17 per cent. of nitrogen, equivalent to 8.71 per cent. of ammonia. The cotton seed meal contains, also, 2.78 per cent. of acid sol. phos. acid, and 1.43 per cent. of potash. The acid phosphate used contains 12.88 water soluble phosphoric acid, 2.02 citrate soluble and 2.53 acid soluble. The muriate of potash contains 52.31 per cent. of potash. These percentages are as reported by Dr. Lupton, chemist of the college and station. All fertilizing material intended for experiment is submitted to him for analysis before being used.

The following table shows quantity of potash, phosphoric acid, nitrogen (and its equivalent of ammonia) contained in the different fertilizers used per acre :

Plot No.	Names of Fertilizers.	Lbs. Potash.	Lbs. phosphoric Acid Available	Lbs. Phosphoric Acid Insoluble.	Lbs. Nitrogen.	Lbs. equivalent to Ammonia.
1	96 lbs. Nitrate Soda	.....	....	....	14 58	17.70
2	240 lbs. Acid Phosphate	....	35.96	6.07	..	.....
3	64 lbs. Muriate Potash	33.47	.....	.....	....	.....
4	No Manure	.....	.....	.....	....	.....
5	96 lbs. Nitrate Soda, 64 lbs. Muriate Potash	33.47	....	.....	14 58	17.70
6	96 lbs. Nitrate Soda, 240 lbs. Acid Phosphate	....	35.96	6.07	14 58	17.70
7	64 lbs. Muriate Potash, 240 lbs. Acid Phosphate	33.47	35.96	6.07	.....	.....
8	No Manure	.....	.....	.....	....	.....
9	96 lbs. Nitrate Soda, 240 lbs. Acid Phosphate, 64 lbs. Muriate Potash	33.47	35 96	6 07	14 58	17.70
10	240 lbs. Floats	....	20 08	46 84	....	.....
11	240 lbs. Floats, 96 lbs. Nitrate Soda	.....	20.08	46.84	14.58	17.70
12	No Manure	.....	.....	.....	.....	.....
13	848 lbs. Green Cotton Seed	10 6	.....	10.17	21.2	25.74
14	848 lbs. Green Cotton Seed, 240 lbs. Floats	10 6	20 08	57 01	21.2	25.74
15	4,240 lbs. Stable Manure	28.40	....	13 14	26.71	32.43
16	240 lbs. Acid Phosphate, 240 lbs. Cotton Seed Meal	4 2	35 96	13 27	16 80	20.35

Nitrogen, Potash and Intercultural Experiments.

In addition to the co-operative experiments already mentioned, Mr. A. F. Cory, Mulberry, Autauga county, an Alumnus of the

A. & M. College, will conduct some special nitrogen, potash and intercultural experiments during the present year. He and others will also co-operate with this station in comparing varieties of cotton, which will be furnished from this station. In addition to the experiments with fertilizers to learn what the different soils of the State need, plants of a few standard varieties of grapes, strawberries and raspberries have been presented to each experimenter in order that the adaptation of these varieties which have proved especially successful on the grounds of this station, are adapted to cultivation on the various typical soils of this State.

In order to supply information as to the cultivation and other treatment of these plants and to secure uniformity of treatment in all cases, a bulletin of information upon grapes, strawberries and raspberries will be issued during the next month.

REPORT

OF THE

ALABAMA WEATHER SERVICE.

Co-operating with the U. S. Signal Service.

January, 1891.

STATE POLYTECHNIC INSTITUTE,
Auburn, Ala., February 15th, 1891.

The precipitation for the month was well distributed, and was above the average at all the stations. The continued rains have placed the roads in bad condition, and in some of the counties are rendered, in places, almost impassable. The average rainfall for the State was 0.67 inches above the normal.

The temperature has ranged rather high and the weather has been generally mild. With the exception of a few days the atmosphere was sufficiently warm to cause the buds of the forest plants to swell, and in some instances delicate flowers came forth. The average temperature was 2.°2 above the normal.

The farmers, however, have been delayed in the preparation of the land by the damp condition of the soil.

J. M. QUARLES, Assistant.

P. H. MELL, Director.

MONTHLY SUMMARY.

Atmospheric pressure (in inches), monthly mean, 30.181; maximum observed, 30.556, at Auburn on 7th; minimum observed, 29,519, at Chattanooga, on 1st; range, 1.037

Temperature (degrees F.), monthly mean 45.1; highest monthly mean 51.2, at Uniontown; lowest monthly mean, 39.4, at Valley Head; maximum observed, 80, at Citronelle on 30th; minimum observed, 18, at Jasper on 4th; range for State, 62°; greatest local monthly range 53, at Citronelle; lowest local monthly range 38, at Mobile.

Precipitation, including melting snow, in inches.—Average for State, 6.03; greatest, 8.11, at Jasper; least, 2.96 at Citronelle.

Mean relative humidity, 77.7 at Auburn; 87.3 at Valley Head; 74.5 at Uniontown.

Wind—Prevailing direction, N. W. Miles traveled, at Chattanooga, 4596; at Montgomery, 4109; at Mobile, 5829; at Auburn, 3227.

Notes from Observers.

Greensborough, (M. H. Yerby).—This month has been unusually wet, raining eleven days, and rainfall amounting to 6.75 inches; in consequence of which farm work is very backward; scarcely any plowing has been done in this section. The roads are almost impassable for any kind of vehicle.

Livingston (J. W. A. Wright). Our normal temperature for January being 45°, the average for this January was 1° colder than usual. The total rainfall for this month (7.46 inches) nearly two inches above the normal. Our first wild flowers for early spring began blooming; the star chick weed (*Stellaria media*) and Bluets or Innocence (*Housatonia cærulia*). On 31st temperature rose to 74°, almost summer heat.

TABLE OF SOIL TEMPERATURES—January, 1891.

(The observations for this table were taken at Auburn, Ala.)

A. M. Lloyd, Observer.

Note.—There are three sets of thermometers. On the 1st of January they were arranged as follows: One set ranging from 1 inch to 96 inches was placed in clay soil on the college campus for the purpose of determining the "frost line" among other problems that will require several years of continued observations. The other two sets were left in their former position, viz.;—One on the hill and the other in the bottom. They were left their to determine the effect produced upon the temperature of the roots of plants by stirring the soil over one set, and permitting the soil to cake over the other.

Depth in Inches.	Set No. 1, On Hill.	Set No. 2, On Hill.	Set No. 3, In Bottom.
1	45.5°	This set has been removed to College campus for another experiment.	46.3°
3	45.5		45.6
6	45.3		45.8
9	44.9		45.3
12	45.2		45.5
24	48.6		49 1
36	50.6		50.5
48	52.7		52.4
60	53.8		54.1
72	.....		
84	.....		
96	.....		

Monthly Summary of Meteorological Reports of the Alabama Weather Service. January, 1891.

Stations.	Counties.	Altitude.	Latitude.	Longitude.	Barometer. Monthly Mean.	Barometer. Max. Height.	Barometer. Max. Date.	Barometer. Min. Height.	Barometer. Min. Date.	Temperature. Monthly Mean.	Temperature. Mean of Max.	Temperature. Mean of Min.	Temperature. Max. Height.	Temperature. Max. Date.	Temperature. Min. Height.	Temperature. Min. Date.	Temperature. Monthly Range.	Me'n Daily Range	Total Precipitation.	Clear Days.	Fair Days.	Cloudy Days.	Days of Rain.	Prevailing Wind.	Observers.
Valley Head	DeKalb	1031	34 34	85 37	....	.....	....	.....		39 4	49 1	2 98	69	31	20	4	49	19 3	7 34	10	6	15	9	N E	E. P. Nicholson.
Florence	Lauderdale	.....	34 48	87 37	.....	.....	....	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	C. W. Ashcroft.
Chattanooga	Tennessee	783	35 03	85 30	30 154	30 519	8	29 519	1	42	50 4	34 3	69	31	26	5	43	16 1	6 31	15	11	15	15	N E	Sgt. L. M. Pindell
Montgomery	Montgomery	219	32 22	86 23	30 196	30 412	19	29 623	21	46 9	55 7	38 1	76	30	28	19	48	17 6	3 57	15	8	8	13	W	Sgt. L. Dunne.
Union Springs	Bullock	516	32 12	85 39	....	.....		....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	R. J. Grady.
Bermuda	Monroe	.....	31 43	87 12	.....					45 7	.....	.....	73	30	21	14	52	.....	5 00	.....	.....	.....	10	.....	Wm. Fowler.
Mobile	Mobile	30	30 41	88 20	30 148	30 431	19	29 710	1	49	56 3	41 6	68	31	30	19	38	14 7	6 50	5	12	14	13	N	Sgt. A. Pritchard
Carrollton	Pickens	.....	.....	88 03	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	M. L. Stansel.
Auburn	Lee	826	32 40	85 30	30 318	30 556	7	29 764	1	46 2	53 9	38 4	71	31	26	19	45	20 9	4 98	15	8	10	8	N w	J M. Quarles.
Livingston	Sumter	150	32 34	88 08	30 150	30 440	19	29 650	1	43 6	.....	.....	72	31	26	4, 25-26	46	.....	7 46	.....	.....	.....	11	N w	J W. A. Wright
Greensboro	Hale	220	32 41	87 36	.....	.....		.....		44 8	.....	.....	68	1-29-	26	4-19	42	.....	6 75	.....	.....	.....	11	N	W. H. Yerby.
Mt. Willing	Lowndes		32 07	86 45	.....					.....	.....	.....	.....	[31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Wm. Garrett.
Uniontown	Perry	273	32 28	86 44	30 12	30 480	28	29 530	1	51 2	54 6	37 1	74	30	24	19	50	17 5	6 81	11	4	16	12	N w	W. H. Newman.
Citronelle	Mobile	352	31 03	87 30	.....	.....		.....		51 1	61 5	40 6	80	30	27	13	53	20 9	2 96	15	4	12	8	.....	J. G. Michael.
Fayette	Fayette		33 42	83 12	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Dan Collier.
Guntersville	Marshall	655	34 24	86 18	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	A. J. Baker.
Chepultepec	Blount	890	33 58	86 20	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	W. B. Allgood.
Columbiana	Shelby	560	33 15	86 38	.....	.....		.....		42 5	53 5	31 4	72	31	20	4	52	24 1	6 37	.....	.....	.....	9	.....	W. D. Lovette.
Centre	Cherokee	728	34 10	85 42	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Thos. Bradford.
Double Spri'gs	Winston	.....	34 08	85 35	.....	.....		.....		45 9	.....	38 4	65	29	22	18	43	.....	6 18	.....	.....	.....	7	.....	A. M. Weiler.
Butler	Choctaw	.....	32 05	87 24	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	B. F. Gilder.
Jasper	Walker	310	33 49	88 12	.....	.....		.....		40 8	49 7	32	70 5	31	18	4	52 5	17 7	8 11	6	10	15	13	N	Howard Lamar.
Tuscumbia	Colbert	.....	34 42	87 38	.....	.....		.....		40 9	.....	.....	70	31	24	25	46	.....	5 74	.....	.....	18	9	N w	L. B. Thornton.
Bessemer	Jefferson	.....	.....	.....	.....	.....		.....		41 9	49 4	34 4	70	31	24	4-5	46	15	7 52	.....	.....	.....	13	.....	Wm. H. Swann.
Bewton	Escambia	.....	.....	.....	.....	.....		.....		49 1	60 9	37 2	75	30	25	19	50	23 7	5 80	.....	.....	.....	9	N w	W. J. Holland.
Mount'n Home	Lawrence	.....	.....	.....	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	A. J. Weaver.
Edwardsville	Cleburne	.....	.....	.....	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Dodson Bears.
Talladega	Talladega	.....	.....	.....	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	J. O. Huey.
Means	.....	.....	.....	.....	30.181	.....	.....	.....	.....	45 1	54 1	36 1	...	.....	.....	.....	47.3	18 9	6 03	10	8	13	11	N w	
*Jasper	.....	.....	.....	.....	.....	.....	.....	.....	.....	53 4	68 7	38 1	79	8	28	29	51	30 6	.20	22	4	4	3	S	Howard Lamar.
†Jasper	.....	.....	.....	.....	.....	.....	.....	.....	.....	48 5	58 9	38 2	69	5	25	12	44	20 1	3 53	12	1	18	3	N	Howard Lamar
†Union Spri'gs	.....	.....	.....	.....	.....	.....	.....	.....	.....	50 3	.....	.....	71	7	32	28	39	.....	.77	6	13	12	1	S w	R. J. Grady.

* Delayed Reports. November, 1890. † December.